NOVEMBER 1945



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**Vol. 76 No. 11**

**A. PRESCOTT FOLWELL, Editor**

## NOVEMBER CONTENTS



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# Designing and Constructing Concrete Sidewalks

**Determination of width, thickness, and slope of walk. Preparing the subgrade. Mixing and placing the concrete. Use of forms. Finishing the surface and curing. Special surface treatments.**

A SURVEY of pedestrian traffic has indicated that about 40% of pedestrians walk in pairs. To accommodate a pair comfortably, a sidewalk pavement should be at least 5 ft. wide, and this should be the minimum width of street sidewalks. Where there is much walking, 10 ft. should be provided to permit pairs passing each other. If this leaves less than 3 or 4 ft. of sidewalk space between paving and curb, the paving is generally carried to the curb. However, some unpaved space here has the advantage of eliminating the tendency of the sidewalk pavement to push the curb toward the roadway when expanded by warm weather. In business sections the paving usually covers the entire space from building to curb.

Sidewalks along roadsides in unbuilt-up areas where pedestrians are few, may be made only 2½ or 3 ft. wide, if necessary for economy's sake. This width suffices for walks at the rear and sides of residences also; but width of walks to the fronts of houses should be determined by appearance; a 4 ft. or 5 ft. walk for a comparatively narrow house, up to 8 or 10 ft. for a house with wide front.

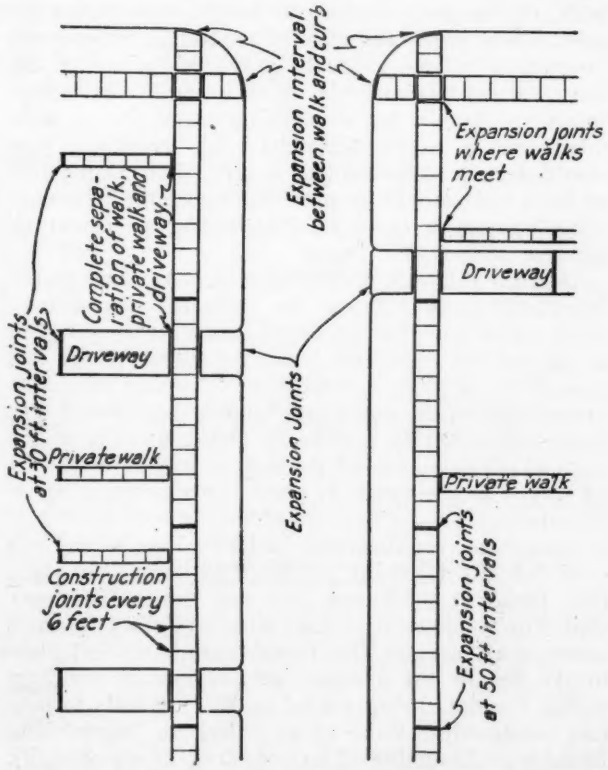
The walk should have sufficient slope toward one or or both sides to drain off all water. A slope of ¼ inch per foot is customary, draining the water toward the gutter. In some cases, where the soil is porous, the walk slopes both ways from the center line. To permit the water to leave the walk, the surface of the concrete at the edge should stand a half-inch above the abutting ground—more, if it is not already sodded, since the growth of grass will raise the soil ¼ inch or more.

Where the walk does not cover the entire width of the sidewalk area, it is preferably placed at or near the property line. Where an occasional shade tree is in the way, the walk may be carried around it with easy curves, allowing space between tree and walk to provide for growth of the former.

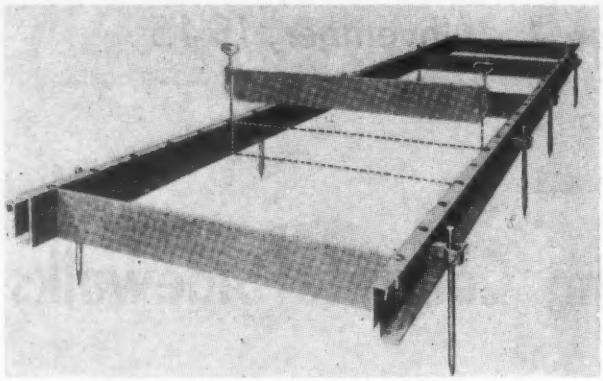
At places where several automobiles discharge passengers at a time, as at apartment buildings, a strip of narrow walk next to the curb and connected with the main walk by one or more cross walks has proved convenient.

Five inches is the minimum thickness of concrete walk recommended by the Portland Cement Association, but 4 inches is frequently used for walks not over 6 ft. wide where there is a good subsoil, well drained. Where a driveway crosses the walk the concrete should be at least 6" thick.

The subgrade condition is very important. The bearing power should be uniform throughout, as a sidewalk slab has little beam strength. All soft and spongy places must be dug out and the holes filled with solid material, well tamped. If the soil is not of uniform consistency it is a good plan to loosen it by harrowing to a depth of one or two inches, using a heavy rake; then, after the side forms have been placed, to screed it to the proper grade and roll it with a hand roller. Both the harrowing and surfacing may be done with a "scratch template." If a good, uniform subgrade is provided, a cinder sub-base is unnecessary; in fact, the latter is a poor substitute for the former. Its chief advantage is to provide drainage of ground water. When used for this purpose, the cinders should be drained to the gutter at all low points; otherwise they will cause accumulation of water at such points, mak-




**General plan of sidewalks, showing expansion and contraction joints, intersection with other walks and driveways, etc.**



**Heltzel steel form; one division plate ready to be placed.**

ing the subsoil soft and causing heaving by freezing.

If the subgrade would otherwise be watersoaked much of the time, cinders, gravel or coarse sand, provided with drains, as described above, may be desirable. In some cases a small drain laid parallel to and near the side of the walk, with outlets at all low points, either alone or supplementing the cinder sub-base, is advantageous.

The trench for the walk should be excavated about 3″ wider than the concrete on each side to allow for placing the forms. The bottom is then brought to grade and to the proper condition as described above. The side forms may be of lumber 2″ thick, but steel forms of equal strength are preferable. These are set accurately to grade and held rigidly to line by stakes or braces. The bottom then is tested and trued up by sliding a screed along the forms, tamping any fresh material that may be added in leveling up the surface.

The sidewalk should be divided into slabs not more than 6 ft. in either dimension, to provide for contraction without cracking. If the walk is more than 6 ft. wide, one or more continuous longitudinal joints are used. These joints and most of the transverse ones are contraction joints—a break in the continuity of the concrete; but at intervals of about 50 ft. expansion joints are formed by an opening about ½ in. wide filled with a compressible material, usually a premoulded strip of bituminous nature. Expansion joints an inch wide should be provided where the pavement abuts against a curb, an intersecting pavement or other structure.

If much sidewalk construction is to be done in the municipality, steel forms are desirable. Wood may warp out of true, the top edges become irregular, and in general the results are less satisfactory. Where two lumber forms abut, a short piece of plank should be placed against the outer face lapping both forms and firmly supported by a stake, to insure that the alignment of the outer face of the walk is true. This should be spiked to the forms to prevent one settling below the other.

Steel forms usually come in 10 ft. lengths and are provided with a locking joint that maintains the abutting forms at continuous line and grade. They are held firmly by steel stakes, with wedges to permit accurate alignment. The forms contain vertical slots in the top of the vertical web to receive dividing plates, the slots being placed at 12″ intervals to permit constructing slabs of any desired length. The forms are obtainable of any desired depth—usually 4″, 5″ or 6″. For 8″ depth, two 4″ forms may be placed one on top of the other.

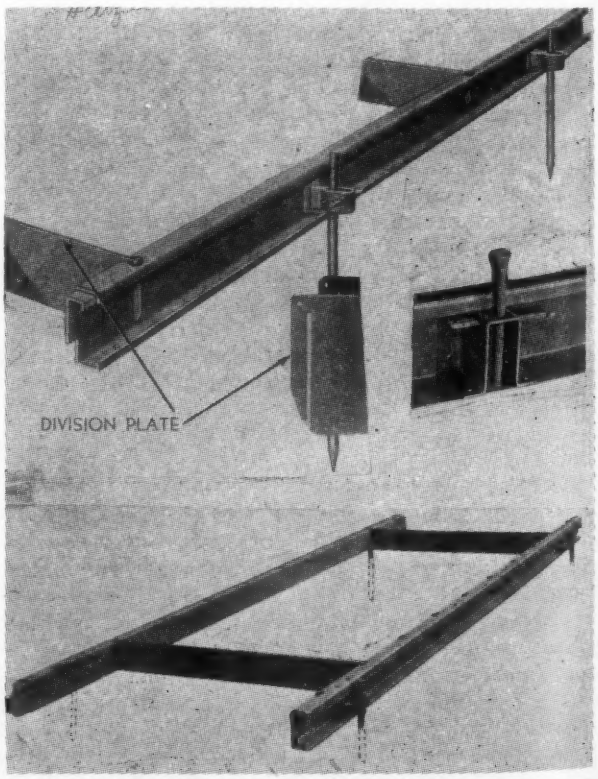
Side forms should be set vertical. It is even more important that the cross-forms or dividing plates be at perfect right angles to both the grade and alignment; otherwise, when the concrete expands, one slab will have a tendency to rise above the other at the joint, or one or both slabs to move sideways.

Wooden cross forms may be used with wooden side forms if the slabs are poured alternately, the intervening slabs being placed after the concrete in those first placed has set and the cross forms removed. This is seldom desirable, and steel separation plates ⅛ to 3/16 in. thick are commonly used. These must be firmly supported in position by stakes or pins, which are removed after the slabs on both sides have been poured and before they have been surfaced. Their position should be marked on each side form to permit accurate locating of the joint when finishing the surface. If the surface of the slab is to be crowned, the cross forms should have a corresponding top edge. For curved walks, flexible steel forms can be obtained, or solid forms for any specified radius.

Steel forms and separation plates are furnished by Heltzel Steel Form & Iron Co., Blaw-Knox Company, Metal Forms Corporation, Binghamton Metal Forms, Inc., and others.

A pavement 5 ft. wide and 4 in. thick will require 167 cu. ft. of compacted concrete per 100 ft., or 10 cu. ft. per slab 6 ft. long. As soon as it has been placed it must be tamped, paying special attention to tamping close to the forms, and struck off with a template riding on the side forms. The surface is then floated and the edges rounded. All this hand work takes considerable time, and the speed of the construction is limited by this. If enough men are employed to complete the finishing at the rate of four slabs an hour (about 175 ft. a day), the concrete will be placed at the rate of 40 cu. ft. per hour. All concrete should be in place in the forms within 30 min. of mixing. Use of plant-mixed concrete delivered in 2/3 cu. yd. batches every 30 min. would be uneconomical, and therefore the concrete is almost always

*(Continued on page 34)*




**Top: Heltzel form showing stake holders. Right: Metaform stake holder: Bottom: Blaw-Knox form with stake holders.**

# Operation of Sedimentation Basins

**Conclusion of article in the October issue. Distribution of flow to a plurality of tanks and across each tank. Pumping and removing sludge and scum. Maintaining mechanical equipment.**

By R. C. MERZ
Sanitary Engineer, Chain Belt Company

Probably the most important design factor influencing tank performance is the need for proper distribution of the flow across the tank width, and right along with that is the problem of proper distribution of flow to a plurality of tanks. This is where the operator comes into this picture very prominently, and where he can begin to exercise his ingenuity. Here he has every opportunity to make studies of his tanks and employ whatever means seems best to improve distribution and improve tank performance. Distribution can be improved by the use of properly designed feed channels, as well as by the use of inlet baffles. It has been estimated by many authorities that good baffling will increase tank efficiency by as much as 25%.*

A well designed settling tank handling a fresh sewage, and having an adequate detention period of say two hours, should remove about 45% of the suspended solids for weak sewage with less than 100 ppm and not less than 60% for a domestic sewage with approximately 300 ppm of suspended matter. If local performance data are far removed from this range, an investigation into the tank hydraulics would be well worth while. Check the tank thoroughly for short-circuiting, using either a dye, such as Fluorescine, a salt solution, or possibly floats. Using some such scheme as this, the actual detention period can be checked. The actual, or flowing through, detention period divided by the theoretical detention is generally accepted as the efficiency rating of a settling tank. This rating should certainly by higher than 50% if the tank is to give anywhere near satisfactory results. If short-circuiting is found to be present, then is the time for the operator to go to work and experiment with different types of inlet baffles placed in different locations, or possibly a different type of inlet itself. Perhaps sewage is fed into the tank squarely against a wood partition wall which spans the tank. He may find that this baffle should be raised, or lowered, or perforated, or louvered. Perhaps he will find that the sewage is brought into the tank at too high an elevation and that it should be made to enter lower down in the tank.

In addition to working out a system of baffling, the operator may also find that much can be done to improve the feed channel itself. If the sewage enters the tank through a series of ports, he might find that these ports should either be increased in number or enlarged. If the sewage enters the tank through the ports in a horizontal direction, he might find it necessary to alter the structure so that the sewage will enter the tank through ports located in the bottom of the channel. Perhaps there is present an old-style feed channel which is of constant width from one end to the other. It might be found possible to improve undesirable flow characteristics by filling in the feed channel, to form a tapered channel, maintaining a constant velocity and equally proportioning the flow to all the ports.

Tank performance will be greatly influenced by the arrangement of the takeoff weirs. The greater the weir length, the lower will be the rate of takeoff and the lower will be the upward velocities over the takeoff area. Low upward velocities at the effluent weir of the tank are highly desirable, since there is then less tendency for the small flocculent solids of the pin-point variety to be carried up and over the weir. In primary tank construction, the practice formerly was to provide a single effluent weir across the end of the tank. Engineers today are recognizing the great benefits to be received from the use of special weir patterns, and primary tank take-off weirs are being designed similar to those heretofore designed for only secondary tanks. Weirs constructed in an H pattern and a U pattern are now in general use, as well as a combination of both. It is now common to extend the portions of the

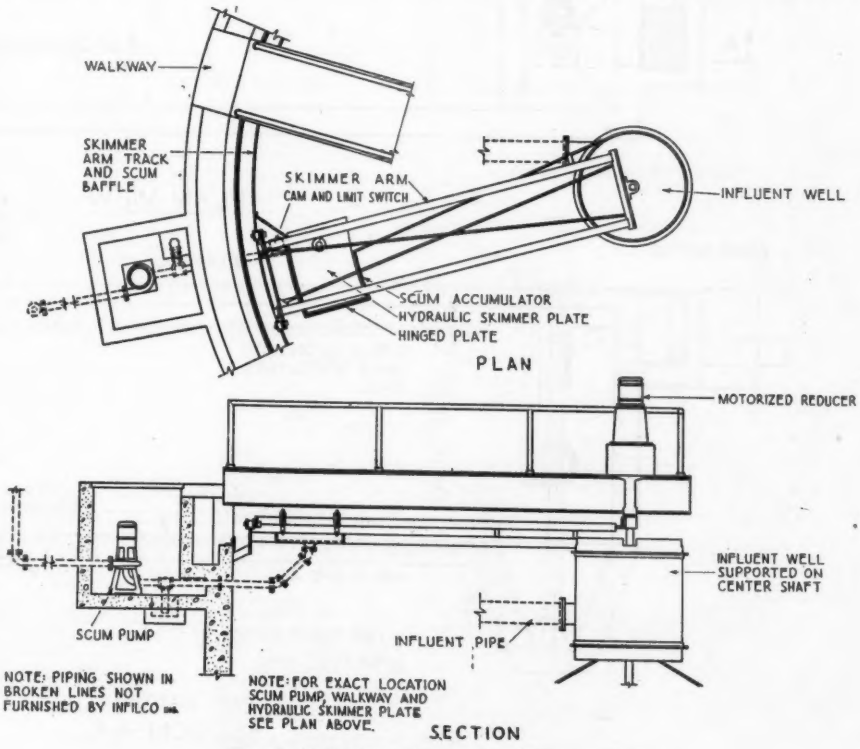



**Fig. 8—Hydraulic skimmer for Infilco clarifier.**

*See "Designing Settling Tanks" in the October issue.

weir along the sidewalls up to 2/3 the length of the tank itself.

An operator often can accomplish much by installing additional effluent weirs if his studies of tank hydraulics indicate a definite need for them. Of course, in many cases, particularly primary tanks, this would be a very great undertaking, for in all probability it would mean the relocation of the corner takeup shaft of the sludge removal mechanism, and existing scum trough. However, any individual that is contemplating the construction of new tanks as a part of a plant enlargement program will want to make certain that the weir design and arrangement receives very careful consideration.

It is necessary to remove the sludge from a tank while it is still fresh, and do so as often as necessary to prevent septic action in the settling tank. This is advisable as an aid both to sludge digestion and to more efficient removal of suspended solids. Septic sludge will evolve gas, and the resulting bubbles as they rise to the surface will disturb the settled material and carry it to the surface, thus interfering with sedimentation of incoming sewage. Further, sludge discharged into a digester should be as fresh as possible in order that the digestion may start under favorable and proper conditions. In the case of final tanks following the activated sludge process, it is even more important to get the sludge out fast before it has a chance to deteriorate.

The length of time the sludge removal equipment operates in the settling tanks is tied in very definitely with the length of time the sludge pump should operate. Except in rare cases, it is generally quite unnecessary to operate continuously conveyor type sludge removers in rectangular tanks. On the other hand, it is common to operate mechanisms in round tanks continuously, since the sludge must be moved a great distance before it finally reaches the center of the tank, and because there is not the sludge storage capacity provided with this type of tank that there is with the rectangular tank. The sludge removal mechanism should be operated at least long enough to make sure that any one scraper has traveled the entire length of the tank bottom. Experience may dictate that best oper-

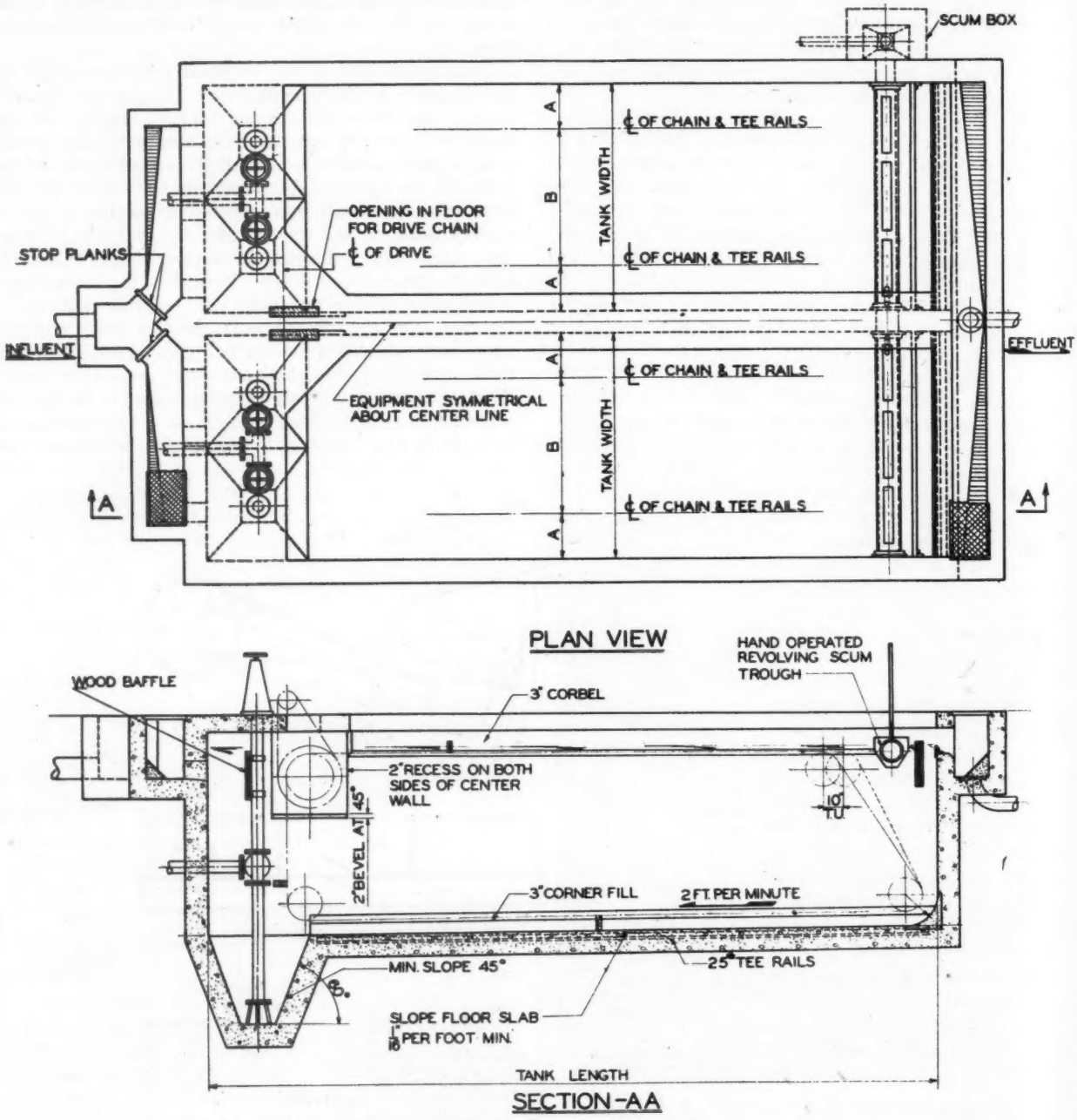



**Fig. 9—Typical plan showing minimum requirements.**

ation can be obtained by having the equipment make one complete revolution. Most primary tank sludge removers of the conveyor type operate at two feet per minute, and on this basis it is a simple matter to determine the number of minutes required for a complete turnover, or a sweep of the bottom by any one scraper.

It is good practice to have the equipment in operation at least 15 minutes before the pumping operation is started. Sludge pumping should then be continued during the time the conveyor is in operation until such time as the sludge begins to run thin. All sludge pumps have, or should have, sampling valves on them so that the nature of the sludge being pumped can be checked. By studying the tank, and varying the routine, an operator will ultimately be able to withdraw a sludge having at least five per cent solids, and probably higher.

There are no fixed rules which anyone can set down for the operation of sludge removal mechanisms, or the operation of sludge pumps. Operators can best learn by experience.

In addition to the time required for operation of the sludge removal mechanism and the time required for sludge pump operation, attention should also be directed to the pumping rate. Most sludge pumps, particularly if they are of the plunger type, can be adjusted to provide at least three different pumping capacities. It is very desirable to pump at the low rate, even though the pump must then be run for a longer length of time. A high pumping rate will not give as dense a sludge as will a low rate, and is very apt to cause the formation of channels or cones in the sludge blanket whereby the clarifier liquid is withdrawn from the tank before all the sludge is removed. If the sludge blanket is broken and the sewage channels down through it, the quantity of liquid in the digester will increase and there will be a consequent increase in the return sludge liquor to the clarifier. The result will be an overloading of the digester, a cooling of the digester, and an increased load placed upon the plant by reason of the excessive return of supernatant.

It is also very important to have adequate scum control. Every effort should be made to provide positive removal of scum from the tank surface. In former days, no effort was made to obtain full-width skimming of the restangular primary tank surface. A clearance of several inches between the tank walls and the ends of the flight was common, and scum simply flowed around the ends of the flight as it moved on its skimming run. If this condition exists at a plant, it can easily be corrected by the installation of wood corbels at the tank surface, bolted directly to the concrete. A clearance of about ½" between the ends of the flights and the corbels is ample to prevent the scrapers from binding.

The line leading from the scum box is generally tied in with the raw sludge line, with proper valves being provided, and scum should be removed at the time that sludge is withdrawn from the hoppers.

Automatic, or semi-automatic skimming devices are now in general use. Most of the tanks constructed more than two or three years ago have the old style concrete trough into which the scum must be moved by hand, after it has been concentrated near the lip by the sludge removal mechanism. With this design, about the only way to get the scum into the trough was to pull it in by means of wood paddles or similar devices, and effect complete removal by creating surface waves which would wash the last particles into the trough. While some water was introduced to the scum trough by this procedure, the amount still was insufficient to cause the scum to flow from the trough into the sump alongside the tank. Generally the necessary amount of water was supplied by hose, since the scum trough should be hosed down at least once a day. Some concrete scum troughs were fitted with simple flushing valves which the operator opened whenever he wanted

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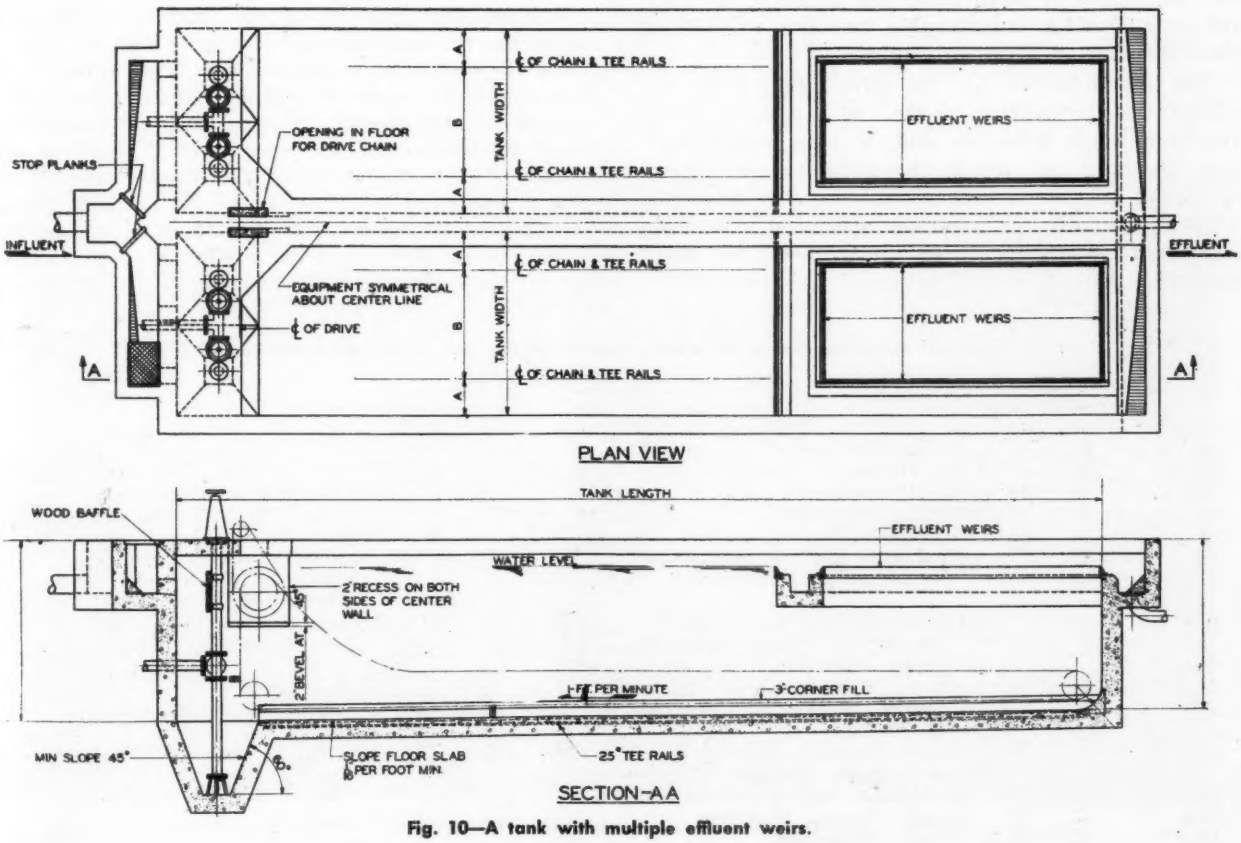
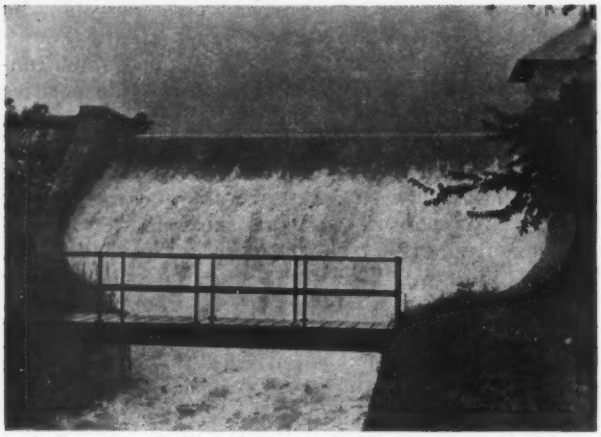



**Fig. 10—A tank with multiple effluent weirs.**



View of spillway overflowing.

# Practica ea

**By H. T. HOTCHKISS and V. A. MASCIA**
**Supervising Chemist and Chemist-Operator, Larchmont, N. Y.**

SHELDRAKE RIVER, a small stream draining approximately three square miles of territory above the purification plant inlet, is the source of supply of the village of Larchmont, New York. The stream runs from its origin in the suburbs of the City of White Plains, through the outlying districts of Scarsdale, New Rochelle and the Town of Mamaroneck and flows into Long Island Sound.

Three impounding reservoirs and a small pond have been developed ahead of the plant intake, providing several isolated points at which algae may grow. Examination shows that the first reservoir, of 7 m.g. capacity, during the period of its existence has acted as a sedimentation basin and accumulated considerable silt. Due to its shallow depth and retention of organic matter, taste and odor-productive organisms find this an ideal spot for quick growth. In consequence the main reservoir, which is about a mile downstream and has a capacity of 144 m.g., is subject to inoculation whenever increased precipitation causes heavier spillway discharge. A small pond just ahead of the main reservoir also has considerable nuisance value from the viewpoint of algae propagation.

The intake works for the purification plant are adjacent to the spillway of the 144 m.g. impounding reservoir, whose numerous shallow coves require vigilant watching to prevent the blooming of various species of microscopic taste-producers. A seldom-used 10 m.g. reservoir lies below the plant and is brought into satisfactory condition for use whenever low water threatens. Since the wash water discharges into this reservoir, it is possible to practice wash-water conservation when desired.

Algae cause most of the tastes and odors in this water all year round, with the critical period occurring between April and September. The number of organisms has varied from a few to 1500 per ml. of raw water. The most troublesome have been Synura, Anabaena, Asterionella, Aphanizemenon, Dinobryon, Clathrocystis, and Ceratium. As many as five or six of the organisms causing tastes and odors have appeared at the same time. A study of the organisms appearing during the various seasons of the year has been made. The following tabulation is given indicating the temperature ranges associated with the cycle of algae development.

An unusual case was encountered in April, 1945. Some Synura were observed in the raw water early in March, but, due to an ice cover on the reservoir, no copper sulphate was added, and the raw water reaching the plant had a decided cucumber odor part of the month and then changed to a pronounced fishy character. The pre-chlorine dose was set at the rate of 20 lbs. per m.g., about 5 lbs. more than the breakpoint; this kept the residual on the filters between .40 p.p.m. and .60 p.p.m. A split dose of carbon was also employed at the rate of 15 lbs. per m.g. No complaints were received from the consumers throughout the month. The temperature of the raw water during March ranged from 38° F. to 46° F. A quick rise in temperature in the first ten days of April was accompanied by an increase in the number of Synura and a stronger fishy odor of the raw water. The following

**Organisms Appearing During the Various Seasons of the Year at the Larchmont Plant.**

| *Month* | *Water Temperature* Min. | Max. | *1944* | *Water Temperature* Min. | Max. | *1945* |
|---|---|---|---|---|---|---|
| Jan. | 38° | 41° | Synura, Asterionella | 36° | 38° | Synedra |
| Feb. | 38 | 41 | Few Diatoms | 38 | 40 | Daphnia, Cyclops, Fly Larvae (corethra) |
| March | 39 | 43 | Few Diatoms, Crustaceans | 39 | 47 | Synura, Meridion, Asterionella |
| April | 42 | 50 | Synura, Asterionella | 47 | 55 | Fragillaria, Synura, Synedra, Daphnia |
| May | 50 | 65 | Asterionella | 53 | 57 | Diatoms, Scenedesmus, Clathrocysitis |
| June | 67 | 73 | Fly Larvae, Euglena, Staurastrum, Synedra, Synura, Asterionella | 57 | 67 | Scenedesmus, Cyclops, Daphnia, Fly Larvae, Synedra, Asterionella, Clathrocystis, Diatoms |
| July | 73 | 77 | Daphnia, Cyclops, Cosmarium, Staurastrum, Synura, Mallamonas, Anurea (Female) | 68 | 73 | Dinobryon, Ceratium, Mallamonas, Asterionella, Synedra, Actinophrys |
| August | 74 | 80 | Synedra, Aphanizemenon, Anabaena, Synura, Mallamonas, Ceratium, Dinobryon | 70 | 74 | Actinophrys, Fragillaria, Ceratium, Synedra, Mallamonas |
| Sept. | 65 | 75 | Synedra, Uroglena, Mallamonas, Actinophrys, Dinobryon, Asterionella | 66 | 73 | Synedra, Microspora, Clathrocystis |
| Oct. | 55 | 65 | Asterionella, Aphanizemenon, Anabaena | | | |
| Nov. | 42 | 53 | Synura, Synedra, Dinobryon | | | |
| Dec. | 36 | 42 | Synedra, Closterium | | | |

# easures for Taste Control

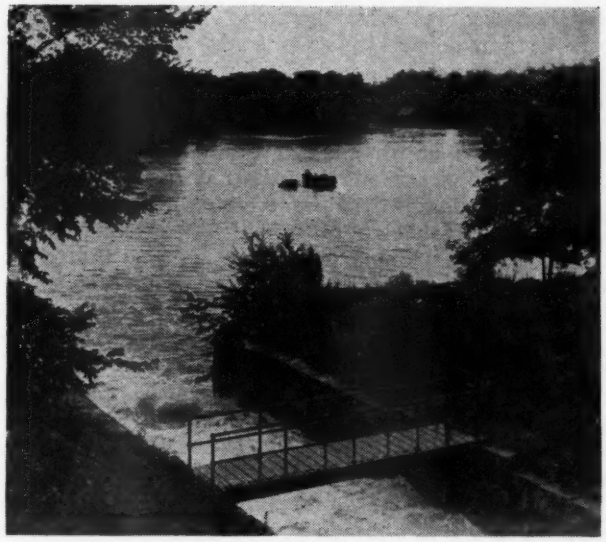
**Methods investigated and utilized to improve the aesthetic quality of the water supply of Larchmont, N. Y., with particular reference to taste and odor.**

tabulation taken from the monthly record depicts the story:

| *Date* | *Raw Water Temp.* | *Remarks* |
|---|---|---|
| 4- 2-45 | 46° | Synura 15 units per ml. |
| 4- 6-45 | 49° | Synura 25 units |
| 4- 9-45 | 50° | Synura 50 units, Synedra 5 |
| 4-10-45 | 51° | 600 Lbs. $CuSo_4$ added to reservoir |
| 4-13-45 | 51° | Synura 300 units, Fragillaria 25 |
| 4-14-45 | 52° | Synura 500 units |
| 4-14-45 | 52° | 300 Lbs. $CuSo_4$ to reservoir |
| 4-16-45 | 52° | Synura still present |
| 4-20-45 | 53° | Synura 50 units |
| 4-21-45 | 53° | Synura breaking up |
| 4-23-45 | 54° | No Synura |
| 4-30-45 | 55° | Few Diatoms, Synedra |

Although the first application of copper sulphate was at 4.2 pounds per m.g. and the second at 2.1 pounds per m.g. yet the Synura were not eliminated. The fishy odor was destroyed by employing a pre-chlorine dose of 34 lbs. per m.g., which kept the residual on the filters between .50 p.p.m. and .80 p.p.m. Carbon also was used at the rate of 17 lbs. per m.g. A few complaints were received April 11th when a slight fishy taste was noticed in the distribution system, but this was quickly rectified when it was found that the pre-chlorine dose was below that needed for break-point. As the Synura increased, the pre-chlorine rate had to be adjusted to meet the added load, and it therefore was necessary to make a day-by-day check on the number of Synura present per ml. of raw water.

Various purification plant procedures are not always unit processes, but may in actual practice secure



**Ten million gallon reservoir which receives overflow from main reservoir and wash water from the filters.**

combined results. Any discussion of chlorination, for example, must necessarily consider not only taste removal, but bactericidal action.

It had been the practice at many plants, for the purpose of improving the bacteriological picture, to dose heavily with chlorine to secure a high bacteria kill, and then dechlorinate to eliminate the excess chlorine. Sulfur dioxide was a popular antichlor when this "superchlorination process" was utilized. Acti-

**Larchmont's main reservoir, showing spillway and gatehouse where the filter plant intakes are located.**

vated carbon also was used for the purpose of dechlorinating water. The practice of chloramination was found, in many instances, effective in carrying chlorine residuals for the prevention of secondary pollution of the water supply, and greatly reducing any chlorinous taste condition in the nearer reaches of the water-main network.

Where satisfactory results are obtained with simple chlorination, pre- and post-chlorination, chloramines or super-chlorination, there is no necessity to abandon these processes. However, in the interest of economy, efficiency, or in the desire to secure a better-quality water, it is always wise and desirable to investigate newer procedures with the hope of securing some benefit from them.

The break-point method of chlorination is, in some measure, a refinement of the super-chlorination practice by which it is possible to regulate the dosage of chlorine systematically so that a minimum application can be made, consistent with the requirement that an oxidation potential will be established sufficient to insure the breakdown of organic materials present that are oxidizable and productive of taste and odor. In the absence of materials which have a reducing influence, there will be a straight line relationship between the dose of chlorine and the chlorine concentration of the solution, being directly proportional under controlled experimental conditions. If, however, chlorine-consuming substances are present, this proportionality will not obtain—at least until the oxidation has taken place and stable products result.

In the simplest case, the break-point is a single minimal point and the dosage-residual ratio becomes constant thereafter. Where the conditions are more complex, there may be other "breaks" as the oxidation potential required to attack more resistant substances is reached. In some instances no true break will take place and the straight line relationship will be reached by gradual slope changes.

It has been found at Larchmont and elsewhere that, in the practical application of break-point procedure, it is not always feasible to regulate plant chlorinators by frequent laboratory tests as lengthy as that required to fix the break-point. Therefore, more consistent results are obtainable by determining the concentration of applied chlorine necessary to produce break-point conditions, and then operating with doses slightly higher than this. In this way, all the benefits of the method are secured and variations of loading are taken care of without constant adjustment of chlorinator setting.

As a matter of fact, break-point chlorination is not a complete answer to the taste and odor problem. Sometimes tastes are noticed, particularly those of "earthy" character, even after such treatment. It is observed that in communities where a high taste level exists, the consumers become accustomed to it and small variations go unnoted. However, where tastes and odors are normally almost non-existent, any increase in the taste level is quickly apparent to the consumer. This means that high quality standards must be maintained continuously, if complaints are to be avoided. Therefore, it is a wise precaution to have in the hands of the purification plant operator a secondary line of defense. This can conveniently be activated carbon, either in the powdered form where sand filters are used, or as granular carbon filters. The carbon functions as an adsorbent of residual tastes and odors. When used following break-point operation as outlined above, it also removes the excess or residual chlorine. Treated in this fashion, the plant can produce a treated effluent of uniformly excellent quality. This effluent can, if desired, receive secondary chlorination or chloramination to meet sanitary regulations with respect to maintenance of chlorine residuals or control secondary pollution as referred to above.

There are other treatment combinations which have been equally successful under various circumstances. Complete adsorption of taste and odor by activated carbon, ozonation processes, and the more recent utilization of chlorine dioxide, are cited as examples of methods which have proved satisfactory.

In dealing with traces of impurities in raw water which are of numerous and divergent character with respect to their action as recorded by the physiological responses of taste and smell, it is well to examine all the tools available for their elimination, adopt the most applicable, and plan a campaign to meet any conditions which may arise, with the object of maintaining high quality standards.

As has been indicated above, most tastes originating in the raw water at Larchmont are attributable to living organisms, which may be controlled to a large extent by the usual copper sulphate application procedure. Some difficulties have been experienced from time to time due to road wash coming from developed sections of the watershed.

## Highway Access Limitations Raise Legal Questions

Whether the free, safe and convenient movement of heavy traffic is sufficient grounds for limiting access to freeways, parkways, streets and highways has been the subject of a special study of judicial decisions by the Division of Finance and Administrative Research of the Public Roads Administration. The conclusions reached by David R. Levine, Transportation Economist of the division, are that the courts will sustain any public limitations, within reason, on the right of the individual to free access to a highway.

"Circuity of travel" is hardly an argument that can be advanced by one whose "ease of access" has been infringed. There is no doubt but that the police powers expressed through parking regulations, prohibition of U turns and one-way streets do force a certain measure of circuity of travel upon holders of property abutting a street, yet no compensation has ever been allowed to an individual whose "rights of access" were infringed thereby. Such police regulations are in the interest of the majority and have always been sustained by the courts. The establishment of freeways and parkways is but the next logical step in progressive highway development. It is probable that it is the newness of the concept that has caused much of the concern about the whole question.

However, it would be well for public highway officials to come before the court fully prepared to demonstrate that the public interest will be served better by partially restricting the rights of an individual in favor of the primal rights of the majority to a free and expeditious use of a public convenience to facilitate travel and speed up commercial transportation.

Compensation should, of course, be made to an individual whose legal rights have been infringed upon by the community. But if the compensation granted is excessive, it will seriously interfere with, if not actually prohibit, all public road construction.

Copies of the bulletin, "A Study by the Division of Financial and Administrative Research", by David R. Levine, can be obtained from the Public Roads Administration, Washington 25, D. C.

# Winter Operation of Sewage Filters

**Experiences in sub-zero weather in Canada with both covered and uncovered sprinkling filters at R.C.A.F. training schools.**

DURING the war the Royal Canadian Air Force operated schools in Manitoba and Saskatchewan, where the temperature fell below zero every night for weeks at a time during winter months. These schools were served with sewage treatment plants of several types. Five of them included trickling filters with Dorr distributors and "Clarigesters." In three of them both clarigester and filter were covered; in another, the Gimli plant, the continuous-flow filter was covered but the clarigester was not; and in the Rivers plant the clarigester was covered and the continuous-flow filter was not. The filter covers consisted of one-inch shiplap and two-ply ready roofing, supported by light trusses.

The Gimli filter was 45 ft. in diameter, containing 5 ft. of 1½" to 3" screened crushed granite. The Rivers filter was 35 ft. in diameter and contained 3 ft. of similar medium. The other three filters contained 6 ft. of crushed stone, 1½" to 3" granite in one case and 2" to 6" limestone in the other two. In designing all of these except the Rivers plant the following previously determined facts were kept in mind:

1—Worms are active at all seasons unless the temperature drops below 43°F. In cold weather they leave the rock surface, remain most abundant in the upper six inches, and return to the surface algal growth with rising temperature.

2—The flow of air in filters with continuous water distribution is a straight-line function of the difference between the temperature of the outside air and the temperature of the water.

3—During intermittent distribution, pulsations in air flow take place as a result of the increased heat during the dosing period.

4—Intermittent dosing does not bring as much air through the filter as continuous dosing.

5—When the water is colder than the air, the flow is downward through the filter medium; and when the air is colder than the water, the flow is upward through the filter.

The accompanying charts show daily maximum and minimum outside temperatures, temperatures of the filter buildings, and temperatures of the filter rock taken one foot below the rock surface. The rock and the building temperatures were taken at noon and midnight each day.

A comparison between an uncovered filter at Rivers and a covered filter at Gimli is of interest. Both had continuous flow.

In the filter at Gimli, with 5 ft. of crushed granite, the rock temperature varied during the winter between 50 deg. and 62 deg. F., and the building temperature was, except during prolonged sub-zero weather, between 43 deg. and 60 deg. The film remained on the rock all winter, and during the second year's operation there was little variation in effluent B.O.D. tests between summer and winter.

Troubles at the Rivers plant during two winters' operation included the following:

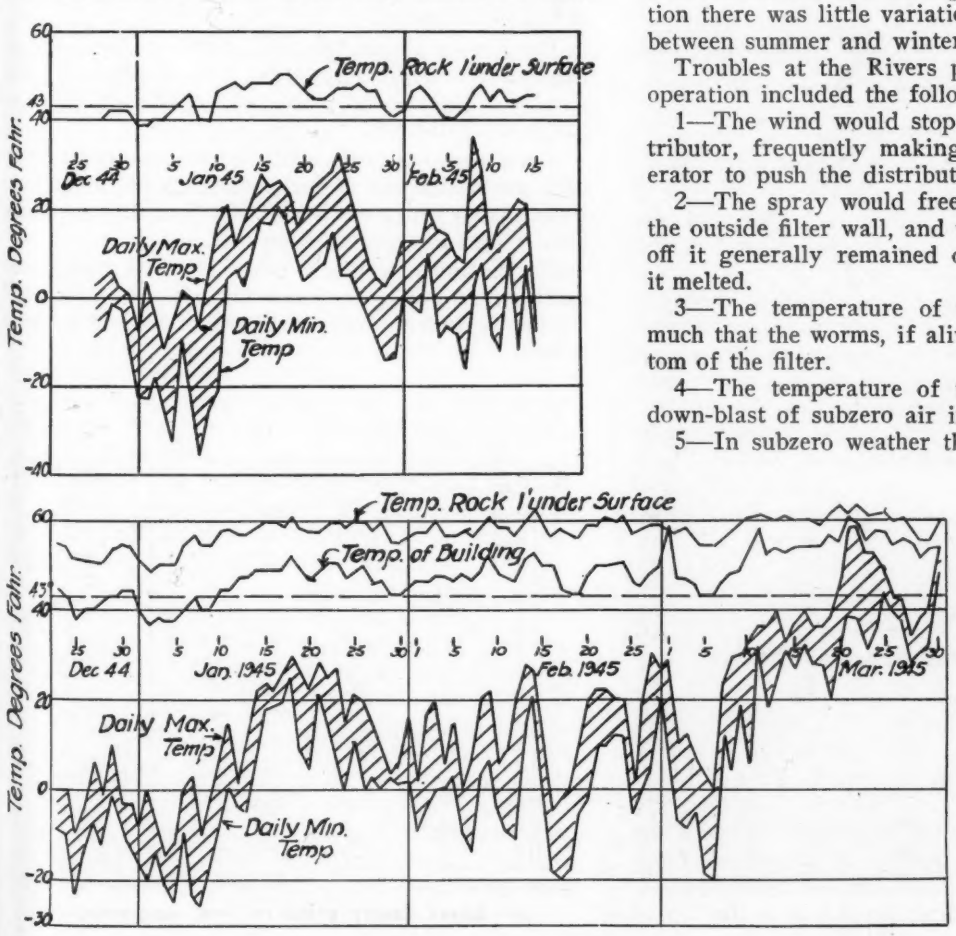
1—The wind would stop the revolving of the distributor, frequently making it necessary for the operator to push the distributor to keep it revolving.

2—The spray would freeze on the center pier and the outside filter wall, and when this ice was chipped off it generally remained on the filter surface until it melted.

3—The temperature of the rock was reduced so much that the worms, if alive, would be near the bottom of the filter.

4—The temperature of the spray would cause a down-blast of subzero air into the filter.

5—In subzero weather the slime would slough off




**Temperatures of air and filter bed during the winter of 1944-'45. Upper, open-air biofiltration plant at Rivers. Lower, covered filter at Gimli.**

the rocks, and the rocks would remain clean until the spring, when the slime would reappear.

6—During two winters the B.O.D. tests of the filter effluent were almost the same as the B.O.D. tests of the primary clarifier effluent, indicating that during the winter the open-air filter was performing no useful service.

The sewage, in passing through the Rivers plant, did not lose much heat. In January, 1945, when the temperature reached 30 deg. F. below zero, the temperature of the raw sewage was 50 deg. and the effluent from the secondary clarifier was 44 deg. F., or a temperature drop of 6 deg. F.

### Other Experiences

Miscellaneous experiences with various Royal Canadian Air Force sewage plants include the following:

The plant at Estevan, Sask., with an intermittent clarigester and covered filter was started when the temperature was 54 deg. F. below zero, and no difficulty was experienced due to freezing.

During subzero weather all covered filters are filled with a dense fog.

At Paulson the temperature drop through the plant was recorded on February 2nd, 1945, and there was a loss of temperature of 4 deg. F. through the plant. At this time the raw sewage was 58 deg. F., the dosing tank temperature was 56 deg. F., and the final effluent temperature was 54 deg. F.

The clarigester at Gimli was built without an overhead protecting structure. No trouble was experienced from freezing of the clarifier surface during two winters' operation. The outside temperature reached 24 deg. F. below zero in the first winter and 36 deg. F. below zero during the second winter. However, after the second winter there was some disintegration of the concrete at the water level of the clarigester outlet trough or launder.

### Conclusions

The conclusions from the operation of these plants are as follows:

1—Open-air filters are not suitable for districts where the winters are cold; or, at least, they should be installed with caution.

2—In covered filters there is no danger from freezing either in intermittent or in continuous-flow filters.

3—With covered filters the temperature of the rock is about 8 deg. F. higher in continuous-flow filters than in intermittent-flow filters.

4—Small clarigesters can operate satisfactorily without housing, provided that they are operated correctly and efficiently.

The above is slightly condensed from an article by J. C. D. Taylor, Flight-Lieutenant R.C.A.F., in the Canadian monthly, *Water and Sewage*.

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## Lakeland's Sewer Service Charge

By placing a special sewer service charge of around 50 cents a month for the average home, with an additional charge of 25 cents per month to cover service to a rear garage apartment, the City of Lakeland, Fla., has accumulated enough money in the past year or so to start a survey looking toward the completion of its sewer system at a cost of about $200,000.

Lakeland's sewer building project is at the top of the city's list of post-war plans, and City Manager Charles Larsen says: "The cost of finishing our sewer system . . . is not expected to increase the city's ad valorem taxes. The cost of additional sewers will be paid from the city's sewer fund."

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## Guard Rail Posts of Sussex Co., New Jersey

Prior to 1943, treated timber posts had been used almost exclusively for the 100 miles of guard rails on the 291 miles of roads in Sussex Co., New Jersey. To eliminate the frequent replacement of those which had been found necessary, Leon McKeon, county road supervisor, tested the substitution of concrete posts, and the initial installations proved so successful that the county cast 5,000 concrete posts in 1944, using department employes in the county shop at Newton, and it is expected that between 4,000 and 5,000 posts will be made in 1945 as part of the program eventually to have all guard rail posts of concrete.

The concrete posts are triangular in shape and 6 ft. 2 in. long. The reinforcing bars are ⅜ in. round. Individual redwood forms are used. The mix is 1:2:3 with 4½ gal. of water added at the mixer. The fine aggregate is fine mortar sand and the coarse aggregate is broken limestone, ½-in. maximum size.

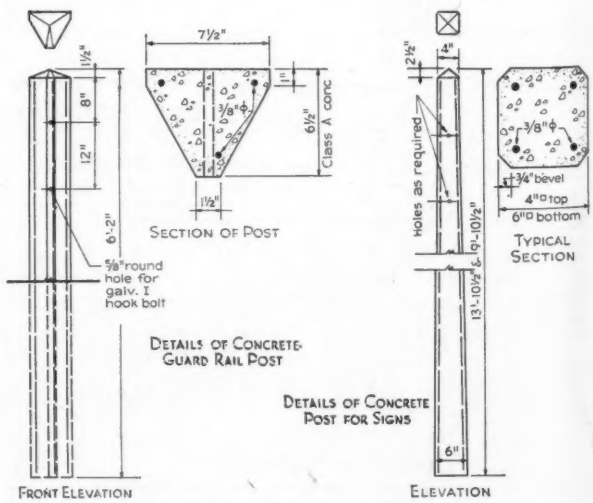
A modern two-sack mixer with a water-measuring device is used. About 100 posts are cast each working day during the winter months and a supply is thus built up to carry through the summer.

When casting is completed each day, the molds are covered with tarpaulins, under which a steam hose is placed. The posts are steam-cured at about 115 deg. F. in the molds for 5 hours. Posts are kept covered all night, removed from the forms the next morning, and stored until needed.

The Sussex County Road Department is also making concrete sign standards. The design of these standards is included in the accompanying sketch of the guard rail posts.

These concrete posts made by the county at $1.10 each are easier and less expensive to place than the timber posts which cost $1.30. The concrete posts also have a very low depreciation cost.

The casting of concrete posts not only produces an excellent type of guard rail but also provides work for the department men during otherwise slack winter months.




**Sussex County guard rail and sign posts.**

# Scituate Builds Wells of Non-Corrosive Materials

## Details of constructing a gravel-packed well 75 feet deep, using 24-inch Transite screen and well pipe.

By WM. J. LUMBERT
Superintendent of Water Department, Scituate, Mass.

THE Scituate, Mass., water department since 1935 has used Transite pipe in constructing its gravel-packed wells, for the screen as well as the well pipe, to eliminate the effect of the corrosive activity of the water. The construction of these screens differs materially from that of metal screens, and the method of placing is different also. These can be illustrated by describing the construction of our most recent well, for which the D. L. Maher Company was contractor.

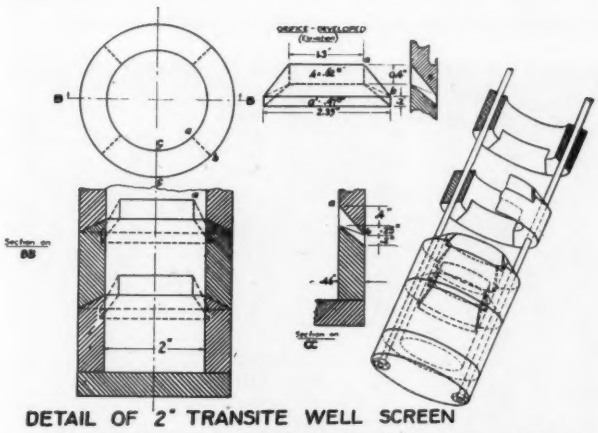
This was a gravel-packed well of 75 feet total depth, using 24-inch pipe and screen. The pipe was the standard Class 150, with a wall thickness of 1.82 inches and weighing 60 pounds per foot. The screen is made up of a number of rings threaded on long vertical rods, which pass through holes in the wall of each ring. Each ring has a part of the top and of the bottom recessed so that, when they are brought together, four circumferential slots are formed at each joint. The size of the slots is made to fit the conditions found in the water-bearing stratum or the gravel which is to be placed around the screen; also it is governed somewhat by the amount of water to be drawn from the well. The shape of the slot is such that the width on the outside of the screen is less than that on the inside, which allows any gravel that may be drawn through the outside of the slot to pass on through into the inside of the well and drop to the bottom of it rather than clog the screen. In general, the total area of these openings per linear foot of screen is equal to at least one-third the area of the inside of the pipe.

The well pipe came in 13-foot lengths, which were joined together by sliding-fit couplings 18″ long. Where the well is on the end of a suction line, a rubber-ring coupling is used, a ring being placed between the coupling and each of the pipes being coupled, to give an air-tight joint. In this well, however, the pump was set inside the screen and the slip-fit coupling was used.

To fasten the coupling in place and support the line of pipe while it was being lowered, twelve holes for ⅜″ screws were bored with an electric drill, equally spaced in two circumferential rows 6″ apart, the spacing being staggered. A ⅜″ Parker Kalon screw was used in each hole, giving 12 screws in each and of each pipe. Penetration of the inner surface of the pipe was avoided as far as possible.

Wm. J. Lumbert

Placing the screen and pipe was accomplished by the use of tools, machinery and methods in common use for this type of work. Two sets of pipe clamps made of wood were used in placing the screen and pipe in the well. The hoisting cable passes through a pulley carried by a cross-bar at the top of two 30-ft. poles. One set of clamps was placed near the upper end of the screen and a coupling was set on the same end and one row of screws was put in to hold the coupling firmly in place. A rope sling then was placed over the ends of the clamps and over a hook on the end of the hoisting cable. The screen was then hoisted and lowered into



DETAIL OF 2" TRANSITE WELL SCREEN
Showing general method of assembling sceen units.

Bottom section of well screen.

the well until the clamps rested on timbers laid across the top of the well casing. The coupling assembly then was completed on that pipe.

A length of pipe was then assembled with its coupling attached, as before, and lowered into the coupling on the top of the screen, set there carefully and forced home. Then the upper end of the coupling was made fast to this pipe by means of setting twelve screws, as before. The pipe with the attached screen was then hoisted to swing free and the lower clamp removed, and the pipe assembly was lowered until the top set of clamps rested on the timbers. This procedure was repeated until the entire assembly was in the well.

**Left: Completed pipe suspended in well. Right: Screen ready to be lowered into well.**

The assembly was then lifted to swing free on the hoist, thus insuring the perpendicularity of the well.

Washed and graded gravel from 1/8" to 3/8" in diameter was deposited around the screen and well pipe up to the elevation chosen for the concrete seal, which was placed later. The cable was slacked off, allowing the pipe to settle; the settlement being less than 1/2 inch.

This completed the installation of this screen and well pipe, the entire operation having been completed in a few hours.

## Treated Wood for Bridge Sidewalks

The bridge engineers of the city of Chicago recently found it necessary to replace the sidewalks on the Wells Street bridge, a double-deck bascule bridge, the lower deck of which has a 17-ft. pedestrian walk on each side.

The project consisted in replacing the sidewalk floors of untreated plank laid on creosoted timber stringers. Plank on the east walk were oak, and on the west walk untreated pine which had been renewed five years previously. Engineers of the maintenance section of the Division of Bridges and Viaducts, after years of experience, attribute the failures of untreated walks to decay rather than to mechanical wear. It is their opinion, too, that preservative treatment not only increases the life of the timber by preventing decay, but assures a longer mechanical life also, since decaying timber, even in the early stages of attack, is less resistant to wear than sound timber. Treated lumber has long been used for the vehicular roadway decks on this and other bridges in the city, and protected from abrasion by wearing mats placed over it. Mats, however, are generally omitted from the sidewalk sections on bridges with lift spans in order to hold floor weights to a minimum.

Plans for this work originally called for renewal of the sidewalk plank only, but it was later decided to replace the creosoted yellow pine stringers with salt treated Douglas fir. This combination held additions of counterweights to a minimum and thus effected a saving in costs. The creosoted yellow pipe stringers were in very good condition and were used as wearing surface plank for the roadway of one of the city's smaller fixed bridges. To improve drainage conditions a slight transverse slope in the walk of 3 in. in 17 ft. was provided.

Specifications called for treatment with either chromated zinc chloride or Wolman salts. Floor plank were southern pine 2 x 6 in., dressed and matched, and pressure treated with 1 lb. of chromated zinc chloride per cubic foot. The joists or stringers, ordered later, as previously mentioned, were Douglas fir 3 x 16 in. in size and pressure treated with 0.3 lb. of Wolman salts per cubic foot.

## Sealing Bituminous Roads in Du Page County

**By EUGENE L. GATES**
**Superintendent, Du Page County, Illinois, Highway Dept.**

IN SEALING bituminous roads in Du Page County, Illinois, in past years our general practice had been to distribute the bituminous material and cover it with about 30 lb. per square yard of pea gravel, spread by hand shovels or by mechanical spreaders, backing the trucks over the work. This resulted in a more or less patchy job and much of the gravel soon found its way to the shoulders of the road.

Last year we tried a new plan. We coated a heavy, coarse sand with bituminous material at a central mixing plant and hauled it to the road while hot. Then (instead of spreading it in our customary way), after placing the seal coat we immediately spread the coated sand which, because it was hot, united at once with the other material; and traffic could use the road as soon as the sand had been applied without picking up and without getting tar or asphalt on the autos. We put on about 6 pounds of the coated sand to the square yard.

In spreading the sand we used a Flink spreader, and found that, instead of driving the truck backward, we could drive forward and as rapidly as we desired. With a little practice the drivers could spread the material evenly and far enough to cover the pavement with practically none of the material wasted.

We formerly distributed bitumen on about 1000 ft. of road, then stopped the distributor until we had covered this 1000 ft. with sand or pea gravel. Now, by using the coated sand and Flink spreader we can apply a full distributor load of bitumen and follow about as fast with the coated sand. A mile of road can easily be covered in an hour. We do not have to obstruct traffic or keep the road closed very long while doing this work, which is a great convenience to the traveling public and saves cuss words from the foreman who is running the job because the public run around barricades or knock them down and drive over the fresh surface.

We have found this method of sealing our roads simple and economical. While the coating of the sand adds to the cost, this is more than offset by the saving in labor.

# Financing Sewage Disposal

**Suggestions aimed to help municipalities to decide how to finance sewage treatment plants with the least possible ultimate burden upon the taxpayer.**

UNDER date of January 15, 1945 the Pennsylvania Sanitary Water Board issued a list of 187 governmental units to which it had directed orders to prepare plans for sewage treatment works. Later it issued a supplementary list of 92 such units. These orders have raised many questions: How finance the required construction? How adjust the new financial burden to the heavy demands already made upon taxpayers? Should new bonds be issued? If so, should the whole project be financed in this manner? Or should a combination of long-term bonds and temporary loans be utilized to finance the construction at least partially on a pay-as-you-go basis? Should the entire cost be met ultimately from taxation, or should sewer service charges be applied? If the latter, should revenue bonds be issued? If the municipality has not sufficient borrowing power, should a municipal authority be created?

The above is quoted from the Foreword of a pamphlet entitled "Purifying Pennsylvania's Streams," prepared by the Pennsylvania Economy League, the purpose of which is to give general information regarding the purification program and sewage disposal methods available, give date showing the disposal facilities and finances of the municipalities of that State, and offer suggestions to aid them in economical financing. The last is of special interest to municipalities in every State; and that part of the pamphlet, omitting reference to laws or conditions peculiar to Pennsylvania, is given below.

Economy should be sought in every step leading to the acquisition and operation of sewage disposal facilities. Realization of this aim has two requisites, first, competent technical advice in both engineering and finance, and secondly, public officials who are determined to get the most for every dollar spent, or that will be spent in the years to come.

Upon the designing engineers should be the responsibility to prepare plans that will provide for the necessary service at the *least possible cost,* in construction, operation and maintenance.

Likewise, upon those who plan the financing there is the equally great responsibility to devise a method that will place the *least possible ultimate burden* upon the taxpayer.

## Methods of Financing

There are several ways in which a municipality may finance sewage disposal projects. Since no two municipalities will have the same requirements or the same financial ability to meet them, *it is always wise to review all of the possible methods of financing, with a view to choosing the method or combination of methods that will impose the lightest ultimate burden upon the taxpayer without impairing the standards of service.*

Construction funds may be obtained from the following sources:

1. Current income—the pay-as-you-go method
2. Special assessments
3. Cash reserves
4. Temporary loans
5. Revenue bonds
6. General obligation bonds
7. Various methods in combination
8. The creation of an authority, which in turn would issue bonds.

*1. Current Income.* Ordinarily, municipalities do not look to current income as a source from which to finance large capital expenditures. However, if the expenditure is not too large, it may be possible and even advantageous temporarily to adjust the tax rate to absorb the cost in whole or in part, in which case all interest charges can be avoided.

*2. Special Assessments.* The various municipal codes either permit or require the levy of special assessments to pay for the cost of sewers. Except in the case of boroughs, they also permit such assessments for sewage treatment plants. Where the benefit is direct, as is always the case when new sewers are laid in front of private properties, this method of financing can be used to advantage to obtain funds to meet the total cost or to defray a portion thereof. Where the benefit is general as well as local, it would seem justified to meet part of the cost through general taxation and part through special assessments in proportion as the benefit inheres to (1) the municipality as a whole and (2) to certain property owners in particular.

*3. Cash Reserves.* Some municipalities have had unusually high revenue receipts during the war years and, for this or other reasons, have been able to accumulate cash reserves greater than normal, which may or may not have been placed in a formal post-war reserve fund. In either case, reserves can be used for no better purpose than to meet capital expenditures for sewage disposal purposes that have been ordered by the Commonwealth.

*4. Temporary Loans.* If the total outlay is not too large, temporary loans may be used to advantage to spread costs over a few years only, thus relieving the municipality of interest on long-term debt and freeing it from long-term annual principal payments. In this manner, the capital expenditure can be met out of current income of three to four years, with short-term loans for only that portion of each year in which the cash position of the municipality necessitates them. Temporary loans also can be used to advantage in some large construction projects in which it may be uneconomical to borrow the entire capital requirements at once on long-term bonds, especially when a substantial portion of them is not to be used immediately.

*5. Revenue Bonds.* Under the Pennsylvania municipal borrowing law and the respective municipal codes, a municipality may issue *revenue* bonds, secured

*solely* by the revenue from the utility in question. This type of bond can be used to advantage where it is feasible to apply and *enforce* sewer service charges, sufficient to meet debt service on such bonds, and particularly where the municipality is already close to its debt limit. However, the fact that the revenue bonds are not supported by the normal tax structure may result in higher interest charges.

*6. General Obligation Bonds.* In Pennsylvania, the municipal governing body can issue bonds up to 2 percent of assessed valuation, while an additional 5 percent can be issued with the approval of the voters. General obligation bonds are secured by the *general* taxing power of the municipality, a feature that is attractive to investors.

*7. Various Methods in Combination.* The first step in the financial program is to determine the total cost of each project and choose the type of bond, if any, to be issued. *Sound public policy requires that bonds be issued only for the amount of money that cannot possibly be obtained in other ways.* Thus, by utilizing a combination of cash reserves (not beyond the point of safety, however), adjusting the tax rate upward for a period of several years, and floating temporary loans to cover a portion of the total cost of construction and possibly an increase in the tax rate, the amount of the bond issue can be cut substantially, with resultant savings in overall interest costs and in annual debt service charges in the years to come. Just as the sewage disposal plant must be tailor-made for each municipality, so should the financing plan be so carefully devised as to result in the lowest possible eventual burden upon the taxpayer, whether in the form of taxes, sewer service charges, or special assessments, without impairing the efficiency of operation or standards of service.

*8. The Creation of an Authority.* A municipal authority is a special governmental corporation authorized by the Commonwealth and established by the governing body of a municipality to carry out certain public functions, one of which may be the construction and operation of sewers and disposal plants. An authority may be formed by a single municipality or jointly by several municipalities. An authority's projects must be self-liquidating and its bonds must be secured solely by the revenues from the authority's operations. Consequently, sewer service charges are absolutely necessary to finance sewage disposal projects which are carried on by means of this type of organization. Municipal authorities have been found useful in meeting certain specific problems, although the fact that the municipality itself can float revenue bonds removes much, if not all, of the apparent advantage of an authority in the case of a single municipality, acting solely within its municipal limits.

As with revenue bonds, it is necessary that revenues from the projects of authorities begin within a reasonable time after the bond issue, so that debt service charges can be met without short-term loans. Where a sewerage system is already in service, this presents little difficulty; but where the construction of new sewers is required, the possibility of effecting a large percentage of connections within a short time, in order to assure early revenues in volume, should be carefully considered.

An authority removes the sewer utility one step from direct popular control. Therefore, the effect of such an organization on the overall pattern of local government warrants careful consideration before final acceptance of the authority as the best means of financing the project.

## Pennsylvania's Program of State Aid

Under Act 82-A, approved June 4, 1945, the Secretary of Health of the Commonwealth of Pennsylvania, may, with the approval of the Governor, grant financial aid to both municipalities and industries to help defray the cost of *preparing plans* for the construction of sewage treatment and industrial waste treatment works. Following are pertinent excerpts from the official statement, describing the method by which such grants shall be made, as approved by the Governor on August 7, 1945.

(1) Financial aid to municipalities and municipal authorities for plans, specifications, and reports for works for the treatment of sewage prepared subsequent to April 1, 1944 and submitted to the Sanitary Water Board for approval, shall be granted in a sum not to exceed fifty percent of the actual cost to the applicant of detail construction plans and specifications of sewage treatment works, intercepting sewers, pumping stations, and other necessary appurtenances as approved by the Board, and an engineering report thereon setting forth the bases of design and a complete breakdown of the estimated cost of construction.

(2) This grant shall not exceed the following percentages of the approved estimated cost of construction of the aforesaid works and shall be suitably reduced by the value of plans, studies, and reports prepared prior to April 1, 1944, and usable in connection with the proposed project.

| *% of Grant* | *for Works to Cost* | |
|---|---|---|
| 3.25 | Up to $10,000 | |
| 2.75 | $ 10,000—$ | 25,000 |
| 2.50 | 25,000— | 50,000 |
| 2.25 | 50,000— | 100,000 |
| 2.10 | 100,000— | 250,000 |
| 1.95 | 250,000— | 500,000 |
| 1.80 | 500,000— | 750,000 |
| 1.70 | 750,000— | 1,000,000 |
| 1.65 | 1,000,000— | 10,000,000 |

(3) The estimated cost of construction shall be based upon the 1942 price level; shall not include the cost of any land, any engineering or legal fees, or any property surveys or other preparatory work which, in the opinion of the Board, should be peformed at the municipality's own expense; and the said estimated cost shall be determined by or approved by the Board, whose decision shall be final.

(4) Payment of State aid shall be authorized by the Secretary of Health upon approval by the Board of the plans, specifications, and report aforesaid and the submission by the applicant of a request for such aid in which provision satisfactory to the Sanitary Water Board is made for the payment of the balance of the cost of the plans, specifications and report by the applicant.

Private interests can obtain the same aid for designing industrial wastes treatment plants; and, upon showing that no satisfactory method has been developed and used successfully, can obtain as much as 50% of the cost of constructing a pilot plant for experimental purposes. In the last instance above, all discovery of new methods must go into the public domain.

The Department of Health reports that $4,250,000 is available for furnishing this aid. The 50% grant will be computed on the basis of the fee that has been recognized and published by professional engineering societies, which must cover preparation of plans, writing of specifications and reports, estimation of costs, and general supervision of the construction. Cost estimates must be based on the 1942 price level, but cannot include land or administrative costs, legal or engineering fees, surveying costs, nor the cost of any work which should properly be done by the regularly employed municipal engineering corps.

If the applicant for a grant includes the anticipated costs of unusual conditions, he must submit full evidence as to why this condition should be anticipated.

*(Continued on page 36)*

# Setting Water Meters

**Comparison of the relative advantages of curb and basement settings, and description of the meter box used in Denver, Colorado.**

By H. L. McLAUGHLIN
Service Engineer, Pittsburgh Equitable Meter Company, Denver, Colorado

WHERE and how to set water meters is a matter for local determination, governed first by climate and then by cost. In warm climates, where freezing is not a factor, there is no question about where or how to set meters—they naturally are set at the curb in meter pits or boxes, since that is the ideal place for them, and installation and servicing cost is held to a minimum. In cold climates the situation is different to a greater or lesser extent, depending upon the minimum degree of temperature, which, of course, governs the depth of pipe bury and consequently the cost of meter boxes. Many water works men advocate that the place to set meters is at the curb in cold climates just as it is in warm climates. However, economy enters into the proposition and causes the choice of basement settings to be made in many instances.

Economy is the one consideration in favor of basement settings. Against original cost must be calculated the ever-after extra cost and difficulty of getting into basements for reading and servicing meters. On original service installations, plumbing will be installed to accommodate the meter in the basement, with any yard outlets using sill cocks and no yard hydrants ahead of the meter. On old connections where there are any yard hydrants, they must be killed and sill cocks used instead and connected to the service pipe beyond the meter so as to measure irrigation water.

The arguments in favor of setting meters at the curb in pits are: (1) facility and speed in reading; (2) Measurement of any water through leaks in the service pipes; and (3) absence of disturbance to the consumer in reading and servicing meters. In new connections, the shut-off can be put in the meter pit and the cost of a service valve box avoided.

## Meter Boxes

Assuming that service pipes are deep enough to be below the ground frost line, it is possible to construct a meter box that will assure freedom from freezing. The point is, how to do that with a minimum of cost and maximum of convenience.

The accompanying pictures show a model meter box setting as used in Denver, Colorado, which was displayed for a long period in the lobby of the water office for the edification of the public. It will serve very well for a demonstration in this case, and for a discussion and consideration of the details of installation.

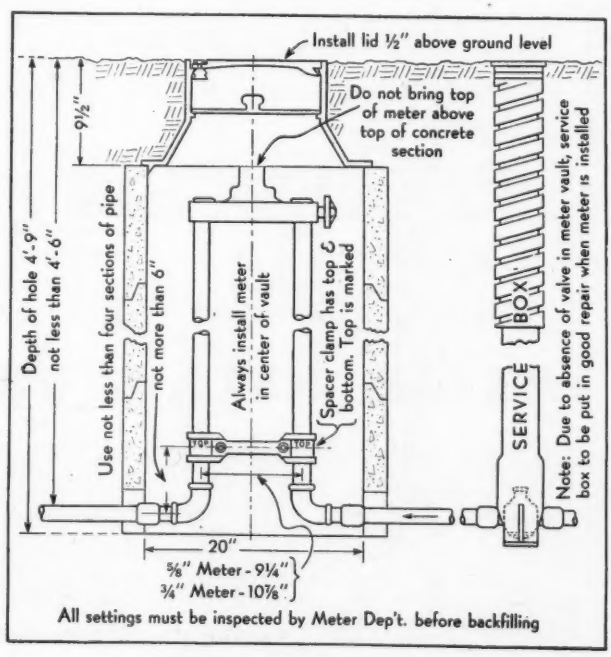
It will be noted that the box used for $\frac{5}{8}$" meters is 20" inside diameter and is constructed of concrete. It is made with four rings for ease of handling, has notches on the bottom ring to straddle the service pipe and anchor the box in place, as well as to extend it slightly below the pipe depth. The meter is raised in the box, to a point no higher than the concrete box, which leaves it some 9 inches below the surface of the ground—the box cover being that high. The box cover is cast iron, 20" in diameter, with hand hole about 11" in diameter for reading or removing the meter.

A close-coupled yoke is used for connecting the meter and a spacer clamp is placed on the riser pipes to stabilize them. This clamp is tapered so as to tend to spread the pipes when tension at the yoke is loosened, thereby simplifying removal, or replacement of the meter and connection washers. There is a sound reason back of each one of these details, most of which will be apparent to any water works official.

The theory of installing meters in boxes without freezing is simply that the box extends below the frost line where the earth temperature is warm. This warm low area sufficiently tempers the air temperature in the upper regions of the box to prevent freezing.

The box must be large enough to keep the riser pipes well away from the side walls. Frost will accumulate on the walls above the frost line and will freeze the pipes and meter if the risers are not kept far enough away. In the Denver box, the yoke brings the riser pipes exactly to the ends of the meter, which in a $\frac{5}{8}$" meter is $7\frac{1}{2}$" end to end. Two $\frac{3}{4}$" service pipes added to the meter spread give a total pipe spread of 9", which in turn leaves each riser pipe about 5" from the side walls. The box top, or lid, must be air tight to prevent entry of the cold air at that point. For the Denver area the 20" box, and other details used, has proven adequate in all respects. A maximum of 25° below zero is the temperature for which Denver boxes are designed.

It is not suggested here that this box is exactly what every other climate requires, but it does seem as if the box size is adequate for about any area if the details are carefully thought out. For instance, it might serve better in some places to keep the meter lower in




**Detail drawing of curb box used in Denver.**

the box without sacrifice of any particular convenience in this type of setting.

Some water works men vary from the Denver style setting in that they hold the meter down to the pipe level. There may be better frost protection provided this way, but there is much greater difficulty in reading and servicing. When the meter is set on the pipe level at the bottom of a pit a hook designed to hold the meter firmly when setting and removing can be used to advantage. With this device it is not necessary to make the pit large enough for a man to enter. It may also be that a box of smaller diameter can be successfully used in such a case. Depth of the pit will determine much on this point.

A few use a much larger diameter box, built like a beehive, with the top contracted to about 24″ diameter. The meter is set on the pipe level in this case, and an ordinary manhole cover can be used if desired. In servicing the meter the man enters the pit and has plenty of room in which to work. Rapid City, South Dakota, and Sturgis, South Dakota, both use this type of meter box with good results. Both places set the meter on the pipe level with a board floor immediately over the meter at the top of the lowest concrete ring and provide a covered trap door in the floor for reading. These boxes are, we believe, 42″ in diameter at the bottom. The cost of this kind of setting is probably about the same as that of the smaller diameter box but with a more expensive cover.

### Materials for Meter Boxes

Other things being equal, it is likely that concrete boxes are best; with tile next; with wood and metal probably the least durable. One operator that we know is using creosoted wood stave pipe for meter boxes. The lumber is bought in full length and cut to suit the depth of setting. This is too new a development to make available any experience data as yet, but it may prove both economical and durable. Concrete boxes are made right on the ground by each water works, using local material and labor. Backfilling around the meter box should be done carefully by tamping the earth to prevent cold air from coming in contact with the box through the soil.

There are many meter boxes and other types of meter setting equipment manufactured as complete units by reputable concerns throughout the country. This material has had wide acceptance in the past and will undoubtedly be extensively used in the future.

### Winter Use of Meter Boxes

The use of meter boxes in cold climates is definitely a subject for local study and determination. The writer is only acquainted with winter climate conditions in the Rocky Mountain general area, extending from the south border of the United States to the Canadian line, all of which area is arid and involves a large consumption of water during the growing season.

In some cases pit meters are read all year around, each month or each quarter, while others are read only during the non-freezing months, a final reading being taken at, say, the end of October and not again until spring.

The above article appeared in the *Pittsburgh-Empire Water Journal,* to which and to the author we are indebted for permission to reproduce it. It describes an excellent type of meter box. In too many cases, however, economy seems to be the chief consideration. We have seen cheap, shallow meter boxes from which the covers were missing and the box filled with dirt, leaves, etc., which had to be removed before the meter could be read. Such practice is indefensible.

Relative to the comparative advantages of basement and curb setting, we suggest the following additional arguments for the former: Where the meter is set outdoors and there is no curb, earth adjacent to the box is seldom level and flush with the top of the cover; and this, projecting above the top of the ground, detracts from the appearance of the street and is apt to be displaced or broken by lawn mowers or automobile wheels. An outdoor meter is exposed to malicious tampering and removal of the cover if this is not effectively locked on. In winter, either servicing or reading meters requires locating and uncovering them if snow is on the ground.

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# How California Highway Department Salvages Bridge Piles

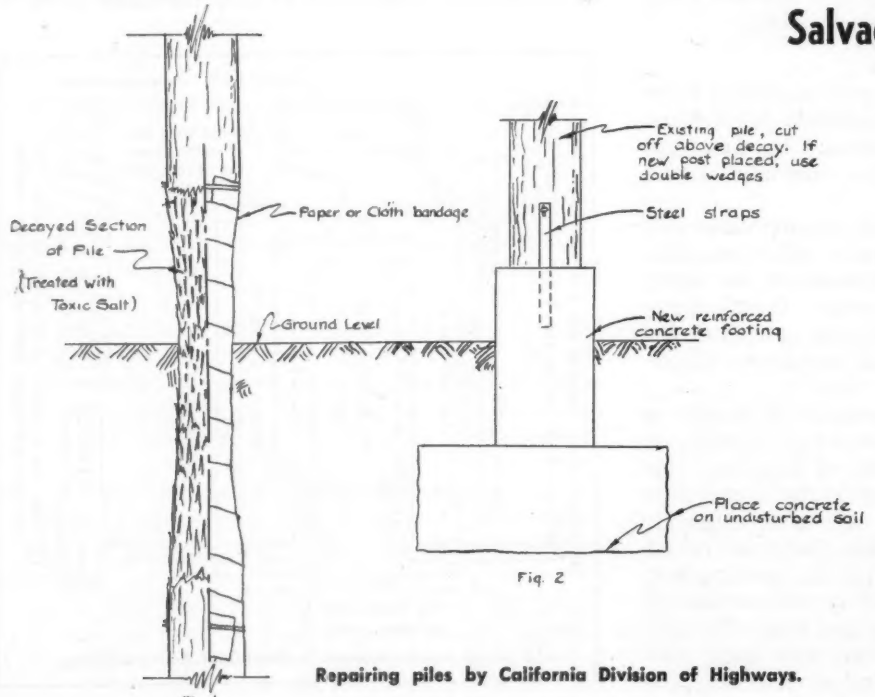



Fig. 1 Fig. 2

**Repairing piles by California Division of Highways.**

Employing much the same methods used as First Aid to control a minor infection of a cut or bruised finger, the Bridge Department of the California Division of Highways in maintaining the piles which support its bridges and other structures, first removes the decayed sap wood of a pile and, providing there is enough sound wood remaining to carry the load, paints the surface with two coats of a toxic-salt wood preservative. The "wound" is then wrapped with a paper or cloth bandage as shown in fig. 1.

In cases where the "infection" has destroyed the load-carrying capacity of the support, a major operation is resorted to. The pile is cut off above the damaged section and a concrete footing is stubbed under the sound portion of the pile, as shown in fig. 2.

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 71-73*

The permanence of these treatments has not been tested to the complete satisfaction of the department. From the available data, it seems probable that the methods of treatment outlined above have no permanent efficacy. Four years after placement of the original piling of the American River Bridge on the Fair Oaks Highway, many of the piles were given the ground-line treatment, while about three per cent of them were stubbed. Seven years later, or eleven years after the original construction, it became necessary to replace all of the piling.

That piles which needed repairs after four years of service lasted for seven years longer would seem to show that the method of repairing was a good one; but that all the piles had to be replaced after eleven years indicates that it would have been much more economical to use creosoted timber or other more durable material in the original construction.

## Blasting Out Teredos

Dynamite charges are being used as a method of destroying the teredo. Back in the days of wooden ships, the unenviable reputation of the teredo was established. Today, the danger to ships is unimportant, but in San Francisco Bay, for instance, during the four years 1917-1921, the destruction of wharves and jetties was estimated at $25,000,000.

The teredo's physical construction and method of operation indicated that a severe shock would have fatal results. A pile driver hammer dropped on the pile destroys teredo life in that timber. Experiments conducted with dynamite charges detonated in the vicinity of teredo-infested piling, also did the work.

Blasting at two-month intervals gives three to four years added life for all piling. A charge of high explosive is suspended in the water between the rows of piles and additional charges are spotted at 10 to 12 foot intervals. Usually ten to twelve such charges are shot at one time, at low tide, and an estimated 75% of teredo life is destroyed. A second charge of dynamite will, in all probabilities, kill the balance of teredo life.

## North Carolina's Road Policy

Among the recommendations presented to the 1945 General Assembly of North Carolina by Governor Cherry, was one relative to the State's highways. In this the Governor called attention to the fact that, because of labor and material shortages, the State had been unable to build the normal amount of new construction which available funds would have permitted; but that, when conditions would again permit, the accumulated surplus in the Highway Fund, together with available federal funds, would enable the State to launch a highway program which would more than make up for the loss in new construction during the war period. Looking forward to that time, he laid down the following general principles:

(1) *All-weather roads* should be made available to every section and community, and especially should all school bus routes, mail routes and roads leading to churches and markets be usable the entire year. (2) *Country, community and farm-to-market roads* should receive increased attention. (3) *Boards of County Commissioners* should continue to serve as the bodies to which positions relating to lateral roads in the respective counties should be addressed, and a closer cooperation with the State Highway and Public Works Commission should be encouraged. (4) *Highway hazards* should be eliminated so far as possible in old roads and avoided in new ones. (5) *A limited system of heavy duty roads* is essential in order to meet the needs of expanding industry.

## Operating Sedimentation Basins

*(Continued from page 19)*

to admit settled sewage to the trough to flush out the scum.

In any event, whether skimming is accomplished manually or by mechanical means, it is necessary to use considerable water in transporting the scum out of the tanks and trough. After the scum is out of the tanks, however, it may be concentrated in a separate chamber. The value of concentration lies in the fact that less water will be pumped to the digester and there will thus be less loading and cooling of that unit.

Scum is easiest handled when relatively fluid. It is in this condition when it first rises to the tank surface, and at that time it may be removed with a minimum of excess water. If allowed to remain too long on the surface of the tank, it starts to thicken and solidify, becoming crusty, and requiring considerable water to transport it. Frequent skimming is therefore advisable.

A recent contribution to the art of scum handling was the development of the revolving skimming pipe, which provides ease of operation, accuracy of control, and watertite seal.* There are also automatic skimming devices available, but these devices are not so readily adaptable to existing tanks as is the revolving skimming pipe.

Having discussed feed channels, baffles, and scum control, Figs. 9 and 10 illustrate very well what might be called minimum requirements. The operator can pick it up from there and elaborate just as much as he pleases, if it will help improve tank performance.

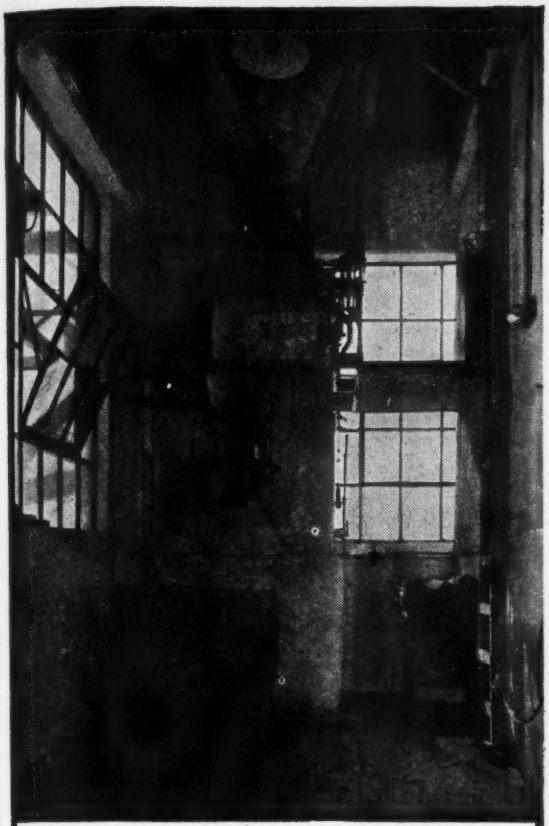
It is obvious from the foregoing that the proper operation of a modern sewage plant requires something more than mere elbow grease. The operator must study his plant and be familiar with its faults and good points. He must be able to minimize the faults by making changes in the plant and by intelligent operation. He must operate his plant so as to take full advantage of the flexibility and other good features that have been built into it.

Budget and present manpower limitations may prevent the foregoing suggestions from being put into effect at once. In fact, it is bound to be a long-term program, since each change in operation or structural design should be based on supporting data from plant operation records which indicate the need for that change.

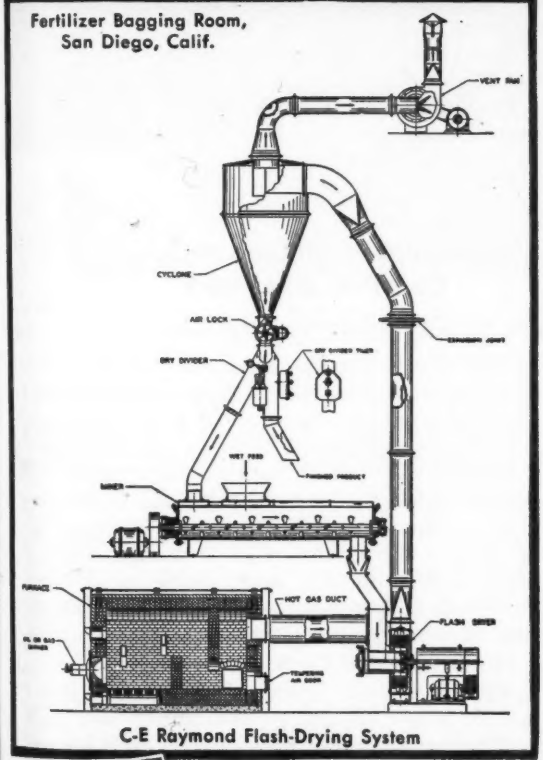
The most important thing is, of course, to keep the plant running in proper repair, and in as good condition as possible. This must come ahead of all research or improvement work. Be sure that the accumulation of grease and scum on the surface of the tank is removed at frequent intervals, at least twice a day, and oftener when necessary. A thick scum blanket, extending several inches below the tank surface, may well release particles to the effluent being withdrawn from the tank. A thick accumulation of scum will also tend to hold material at the surface which would otherwise settle. Keep the scum baffle ahead of the outfall weir clean, especially that portion which is submerged.

If sewage enters the settling tanks over weirs, some solid matter is certain to accumulate in the bottom of the feed channel. These deposits should be periodically stirred up, by means of either a hose or broom, so that

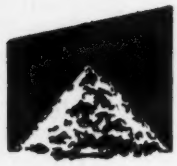
*See "Designing Settling Tanks" in the October issue.



Fertilizer Bagging Room, San Diego, Calif.




C-E Raymond Flash-Drying System

# FERTILIZER  ASH 

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C-E Raymond Systems now demonstrating their economical efficiency are drying or incinerating over a million tons of sewage sludge filter-cake annually.

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*For information on what the System can do, write for Bulletin No. 6791. Address inquiries to the nearest office of the Dorr Company, world sales representatives for the C-E Raymond System in the Sanitary Engineering field.*

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they will mix with the influent and pass on into the tanks before they have had a chance to become septic. Feed channels with port holes in them will not present this difficulty, although the port holes themselves should be cleaned whenever the start of a build-up of sludge or slime is noticed.

Unless some of the scrapers on the sludge collectors are equipped with squeegees, fine solids and grease will collect on the side walls. In warm weather this material will rapidly decompose. These solids can be removed with a stuff brush or a homemade squeegee. After they have been removed, it is always advisable to wash down the walls thoroughly with a hose. Squeegeeing the walls of the tank will prevent the deposition from peeling off in chunks and rising to the surface as floating organic matter.

The outlet weirs should be kept just as clean as possible. This is one tank appurtenance that should receive daily attention. It is the one portion of the tank that always comes in for attention whenever visitors are being shown around the plant. Dirty weirs with sludge built up on them, and trailing long strands of the well-known green slimy material, can't help but make a poor impression on the visitor and raise some doubt in his mind as to the efficiency of operational duties *not* visible. In addition to being kept clean, weirs should be maintained at a uniform elevation so that effluent withdrawal is at the same rate over their entire length.

At least once a year, and preferably every six or eight months, the tank should be dewatered so that the sludge removal mechanism can be inspected. This will provide an opportunity to make any necessary adjustments and to determine just what parts seem to be wearing out. With the long-time deliveries still prevalent during this transitional period, it is more important than ever to keep a close watch on equipment and anticipate repairs at least six months ahead of time. Remember that the cost of mechanical equipment was incurred in the first place only because its use would improve tank performance, and that, therefore, all of the component parts should be kept in good repair, and well lubricated.

An essential part of operation of the plant as a whole, or any individual part of the plant, such as the screen, grit chamber, or settling tank, is to keep good operating records. This is cardinal rule No. 2, second only to that of keeping the plant running and in proper repair. The keeping of dependable and accurate data can do much for the operator in many ways. Suppose, for instance, the addition of another grit chamber, or another settling tank, or additional sludge pumps is being contemplated. If there are accurate data to turn to which have been collected over the past several years, these additions can be planned on a definite and sound engineering basis, rather than by guess work. A performance record kept over many years is also certain to be of value in adapting plant units to meet fluctuating loads, particularly when the data indicate that such loads have been experienced in the past. Law suits are something else to think about. One never knows when some controversy may come up involving the treatment plant, and the best defense possible would be a set of operating records. Any records kept on settling tank operations should at least include the time the sludge removal equipment is operated, the volume of sludge removed, the pH of the sludge, and whatever analytical data can be obtained from both the influent and effluent, and sludge, depending upon how well equipped the laboratory may be.

In addition to keeping daily records, an operator should get in the habit of jotting down any unusual problems he may encounter or experimental observations he may make so that he will have such notes available whenever a group has the opportunity to get together either at a sectional or a local meeting. Talking things over with fellow craftsmen is one of the very best ways of improving plant operation and plant performance.

Rule No. 3 is study those records. It is surprising what can be learned from them. Certain data lend themselves well to the plotting of curves, and startling facts sometime stand right out by so doing that otherwise might remain hidden.

Finally, having kept the plant running, kept adequate records, and studied those records, set up a definite operating routine that is known to be practical, that will give the best possible operation, and stick to it. If alone, the job is indeed difficult. If operating a large plant, with several assistants, work up a definite set of operating and cleaning up instructions, plainly assigning the various tasks, and posts for the guidance of the men. Even though all sorts of odd jobs may be craving attention, do not sacrifice this matter of routine operation and maintenance in favor of them, except in case of emergencies.

Way back in 1937, writing for what was then Municipal Sanitation, Pete Wisely said: "Regardless of how complete and modern a plant may be, its effectiveness and period of service will depend largely upon the manner in which it is maintained and operated." He also said: "Any dissertation concerning the operation of sewage treatment works should begin with the most important unit of all, the operators themselves." Perhaps the writer should have started this article with that statement, but he did not want it to get lost in the light of later remarks. That statement is truer today than it ever was, and he prefers to leave it with the reader as his final thought.

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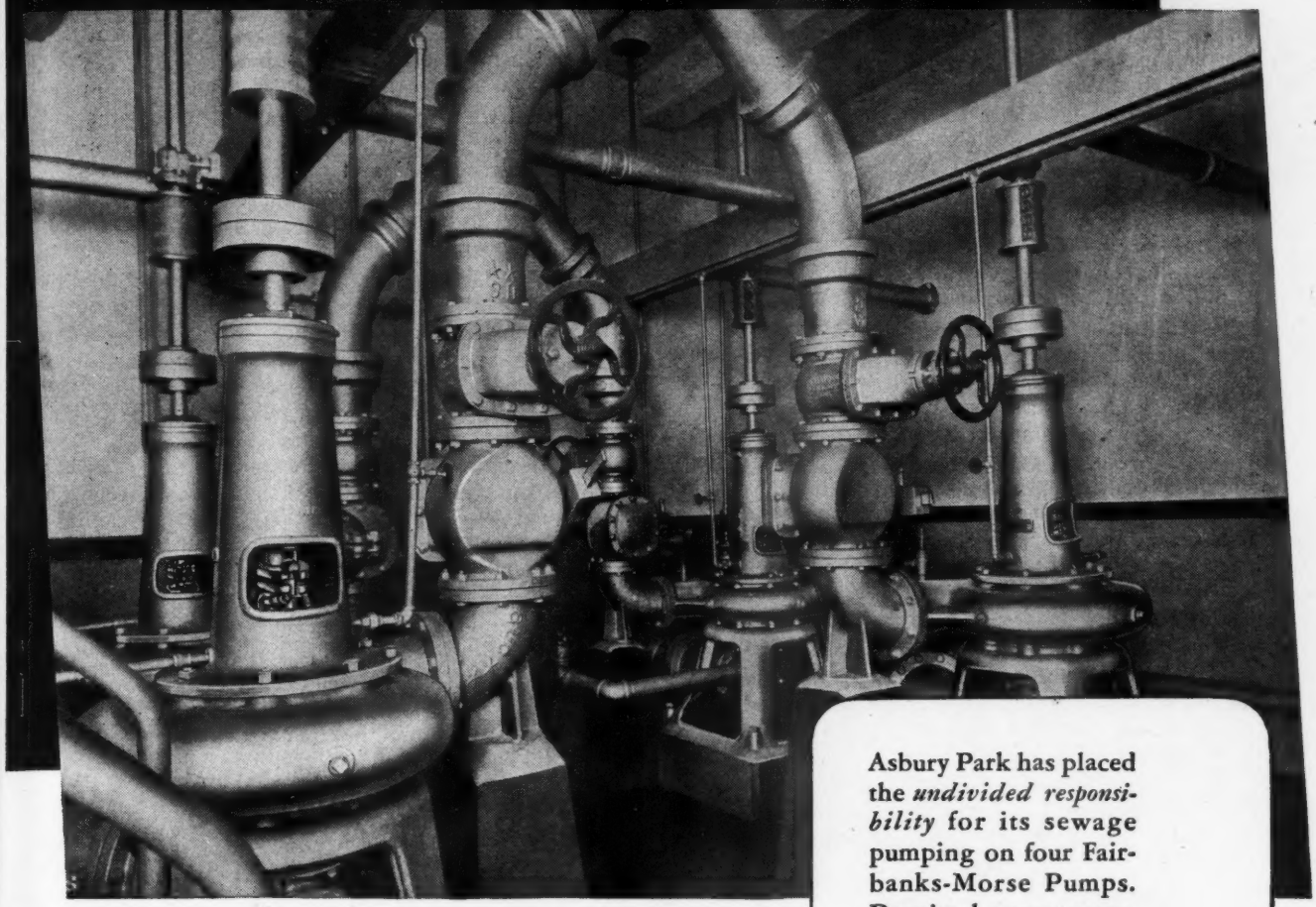
## Designing and Constructing Concrete Sidewalks

*(Continued from page 16)*

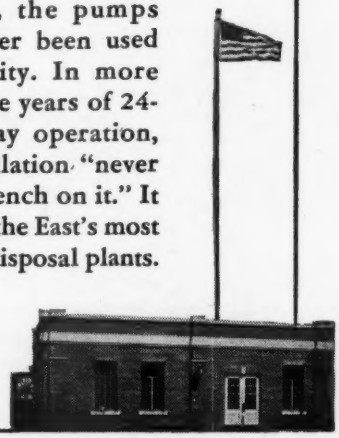
mixed on the job. With the materials placed in the mixer by hand and mixed for 1 minute, the time required for each batch would be about 4 or 5 minutes, or 12 to 15 batches an hour. Therefore a 3½ S mixer working continuously would furnish the required 40 cu. ft. per hr., taking 3 batches to a slab. If the finishing can be completed at the rate of 5 slabs or 50 cu. ft. an hour, a 5 S mixer could be used, requiring 5 or 6 min. to fill and mix, and capable of turning out 50 to 60 cu. ft. per hour. In some cases, using a small gang of 3 or 4 men, the same men do both mixing and surfacing alternately.

The materials should consist of portland cement; clean sand or stone screenings containing less than 6% silt or stone powder and passing a ¼ inch screen; and crushed stone or gravel passing a 1-in. screen and retained on a ¼ in. and preferably graded within these limits, with clean surfaces. The proportions recommended are 1 part cement, 2 parts fine aggregate and 3 parts coarse aggregate. These are by volume, accurately measured. One bag of cement contains a cubic foot. The water used should be perfectly clean, and the amount be from 6 gallons per bag of cement when all the aggregate is dry, to 4 gallons when it is wet. If sufficient water comes to the top of the cement to run off or to show as such after thorough tamping, too much water is being used.

# 85% INCREASE IN SUMMER POPULATION
## Presents No Sewage Problem for Asbury Park, N. J.



Asbury Park has placed the *undivided responsibility* for its sewage pumping on four Fairbanks-Morse Pumps. Despite the great population increase each summer, the pumps have never been used to capacity. In more than three years of 24-hour-a-day operation, the installation "never had a wrench on it." It is one of the East's most modern disposal plants.



ASBURY PARK is another of the growing list of cities helping prove the advantages of Fairbanks-Morse nonclog Vertical Sewage and Trash Pumps.

These pumps, outstanding in their field, are especially designed for economical handling of unscreened sewage.

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For a small amount of pavement the concrete may be hand-mixed. (Sixty years ago hand mixing was considered superior to machine mixing, but since then mixers have been developed to a high degree of effectiveness and hand mixing is becoming a lost art). Good results can be obtained as follows: Measure the sand onto a large water-tight mixing platform. Spread it into a layer of uniform thickness and on this spread the cement. Then, with two men on opposite sides of the platform pushing their square shovels toward each other, turn the material over and to one side in successive layers. Then spread it again and turn it in a direction at right angles to the former turning. Repeat this until it all has been turned four times in four different directions. Then add the water slowly, preferably through a sprinkling nozzle, and mix the mortar with a shovel or hoe. Spread into a flat layer and spread the stone on it. Then mix with shovels, giving it four turnings as described for the mortar.

After the concrete for an entire slab is in place it is tamped thoroughly but not long enough to bring an appreciable thickness of cement to the top. It is then struck off with a screed resting on the side forms, and the surface is smoothed with a float. A wood float is commonly used, as it leaves the surface sufficiently rough to prevent its being slippery when wet or frosty. If a steel float is used, the surface is very smooth and it is desirable to roughen it by light use of a wire or fibre bristle brush. Excessive troweling tends to bring too much water and cement to the top, forming a chalky surface.

After floating, the edges of the slab, at both sides and ends, are rounded to a radius of about ¼ in. by means of an edger or groover (a double edger for simultaneous rounding of both edges at joints). This is to prevent chipping of square edges.

The strength and especially the durability of a concrete pavement is considerably increased by curing, especially where or when the air is dry. Also this protects against accidental marking the surface of the soft concrete. Wet canvas or burlap or a thick layer of hay is commonly used. After the concrete has set, this can be moved ahead and replaced with sand or dirt, which should be kept wet by sprinkling for 3 to 6 days.

Tampers (8" x 8" base weighing 20 to 30 lb. is common), floats, brooms with wire or stiff fibre bristles, heavy steel road rakes, scratch templates, edging tools, jointers, form pullers and other tools for sidewalk work can be obtained from Heltzel Steel Form & Iron Co., Blaw-Knox Co., Cleveland Formgrader Co. and others.

The above refers to one-course construction, which is much to be preferred to two-course for ordinary sidewalks. A one-course walk is stronger, easier to build, and there is no danger of separation of the top from the base. Two-course construction is sometimes used where it is desired to give the surface a special color or other characteristic.

In two-course work the base material is first placed about even with the tops of the side forms, and is tamped. The tamping compacts the material enough to provide about 1-inch space for the wearing surface. The surface material must be placed as soon thereafter as possible—never more than 45 minutes. This material is struck off by a screed or template and floated as in one-course construction.

Special surfaces are sometimes desired to avoid slipperyness on steep grades, to carry unusually concentrated traffic or for decorative effect.

The first objective may be obtained by brushing the surface crosswise of the walk with a broom having coarse, well separated bristles or by spreading and tamping into the surface while soft a thin layer of angular stones passing a ¼ inch screen and throughly cleaned of all fine material. On steep grades, short lengths of moderately flat slopes may be alternated with steps with 4" to 6" rise. If the slope is very steep, steps can be used throughout; but treads of steps should in no case exceed 18" in width.

Where the sidewalk traffic is unusually concentrated, the paved walk should have adequate width, the foundation be prepared with special care, and extra-tough aggregates be used at the surface. The slabs should be 6 in. thick, and they may be more than 6 ft. long or wide. The special surface treatment is commonly obtained by two-course construction.

If it is desired to have the surface dark or with a special color, this also is commonly obtained by two-course construction, the surface material being colored by using chips of stone of the desired color or coloring matter in the cement. If chips are used, the recommended mix is 2 parts of cement, 1 part coarse sand and 3 parts of colored chips. After the surface has been finished, the film of mortar over the chips is removed by washing the surface with an even, fine spray; followed, when the concrete has hardened slightly, by scrubbing lightly with a brush of thin fibre or fine wire, being careful not to loosen the exposed aggregate. Or it may be washed with acid after the concrete has hardened, using hydrochloric or muriatic acid, diluted with 3 to 7 parts of water. The acid solution must then be washed off entirely.

If coloring matter is added, only mineral colors should be used, and the amount should never exceed 10% of the cement by weight. The coloring matter is mixed dry with the cement, being careful to use exactly the same proportion each time and mix thoroughly, to keep the color uniform. Also the mixing water must be added carefully to avoid streaks.

If a gray or blue-slate color is desired, the coloring matter may be manganese dioxide, black iron oxide, or 1 or 2% of carbon black. Other coloring materials used are red iron oxide, brown iron oxide, iron hydroxide (for yellow or buff color). If bright colors are desired, the use of white portland cement is recommended.

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## Financing Sewage Disposal

*(Continued from page 28)*

Finally, all estimates of cost must be approved by the State Sanitary Board.

This proffer of help holds only for plans prepared after April 1, 1944. No grant-in-aid will cover any previously prepared plans which might be used in connection with the finally submitted design. No portion of the State grant shall be used to pay the fee of any person not licensed to practice engineering in Pennsylvania.

Upon approval of plans and cost estimates by the State Sanitary Water Board, and upon the Board's properly recommending the project, the State Auditor General and State Treasurer will issue a voucher in payment.

All applications for aid must be made on a form which can be obtained from the Pennsylvania Department of Health, Harrisburg, Pa.

# STEEL IS "HONORABLY DISCHARGED" —and ready for your plans

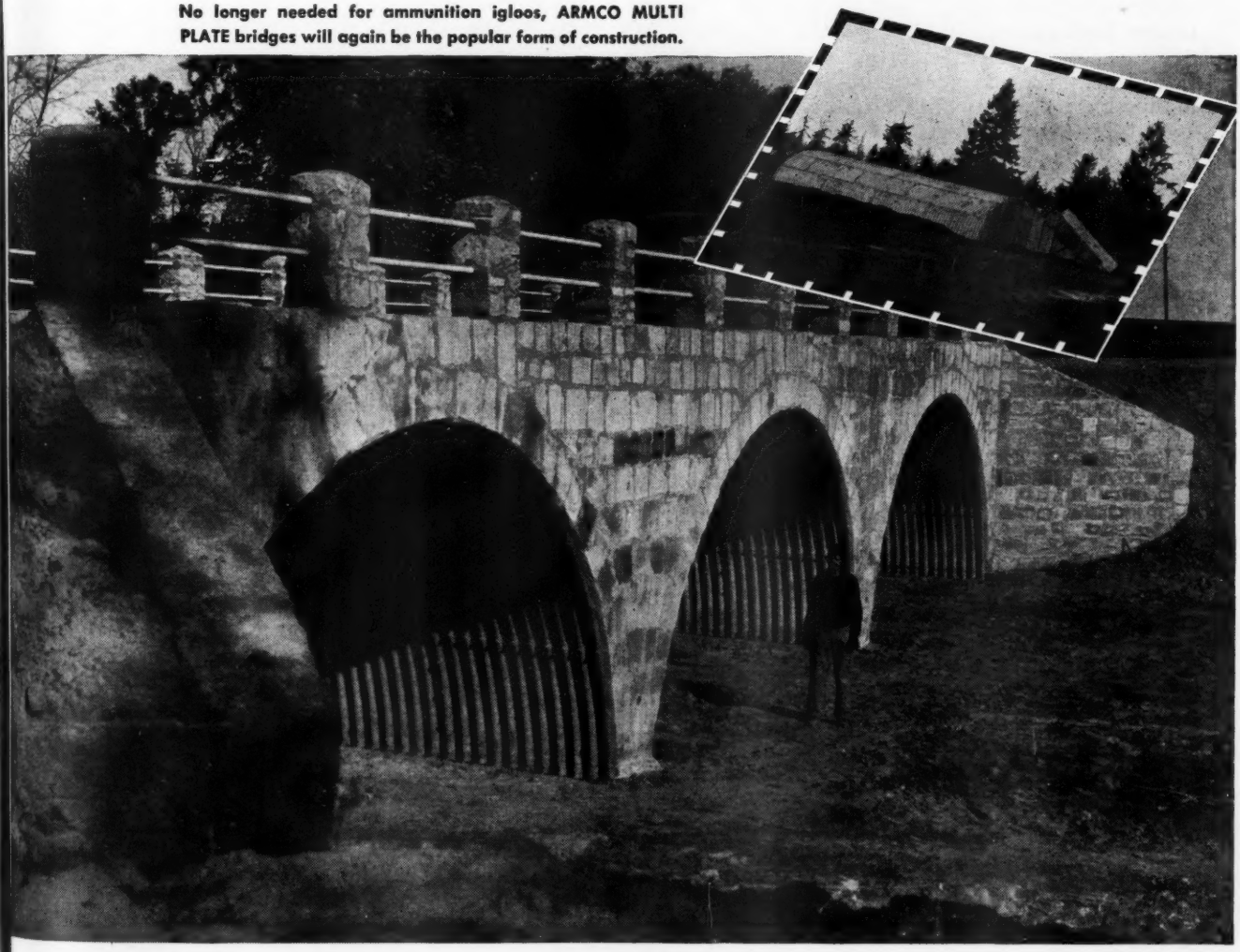
Now it's no longer necessary to substitute less satisfactory products for corrugated metal pipe.

With the war ended in Europe, Asia, and the Pacific, iron and steel have been "honorably discharged" and are again available for your drainage and other needs. During the days of material restrictions and substitutes you will recall how ARMCO Emergency Wood Pipe served a useful purpose. It was another unusual Armco service. But steel, so indispensable for ships, guns, equipment, landing mats, and for portable culverts in the forward areas, is also indispensable for peacetime construction.

Armco products have retained all their desirable features, such as light weight and ease of handling, flexibility and great strength. During their nearly forty years of distinguished service they have consistently proved their durability and saved taxpayers thousands of dollars. Now they are back in improved drainage and other structures—ready to serve you more efficiently and economically than ever before.

For immediate construction or for current and post-war plans, you will find Armco drainage and metal products a wise choice. Order them now or write for further information. Armco Drainage Products Association, 835 Curtis St., Middletown, O.

**No longer needed for ammunition igloos, ARMCO MULTI PLATE bridges will again be the popular form of construction.**



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**ARMCO products: Corrugated Metal Pipe and Pipe-Arches, Paved Invert and Asbestos-Bonded Pipe, Perforated Pipe, MULTI PLATE Pipe, Arches and Pipe-Arches, Drainage Gates, Spiral Welded Pipe, Steel Sheeting, Retaining Walls, Tunnel Liner Plates, Guard Rail, End Sections.**

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 71-73*

# Cleaning a Large Water Main

**A new cleaning machine devised for use in a 32-inch concrete-lined steel pipe 33 miles long, with unique sounding device to permit locating it under ground.**

CAPE TOWN, Africa, obtains its water supply from Steenbras reservoir, 6,000 m.g. capacity, through about 33 miles of 32" steel pipe laid in 1928. This pipe is welded longitudinally and has bell and spigot joints, and was lined with ½ in. of cement. The water has a pH of 5.5, color of 140 ppm, hardness 0.5° Clark, and total dissolved solids of 52 ppm. This water formed a deposit on the pipe 1/16 to ⅛ in. in thickness, which reduced the carrying capacity from 11.215 mgd to 8.9 mgd in ten years.

This deposit was believed to be due to the organic coloring matter, which is in a collodial state in the water, about 75% of it negatively charged and 25% uncharged. The latter is thought to form the deposit through coalescence and precipitation. Microscopic examination of the deposit showed that this coloring matter predominates in it, but there are traces of diatoms, protoza and other living organisms. A filtration plant is now under construction which is expected to prevent such deposits in the future.

In 1938 it became imperative to restore the original capacity of the pipe as far as possible, and the entire line was cleaned and the capacity increased to 10.9 mgd. But five years later, by the end of 1943, the capacity had again been reduced 16%, and the line was cleaned again in 1944.

It had been found that the steel wire brushes used in the cleaning machine left the concrete with a rough surface, and the brushes themselves wore down so rapidly that they had to be replaced every 6 miles. To eliminate these objectionable features, a new type of brush was designed for the 1944 cleaning.

The cleaning machine consisted of three parts: the power unit, a universal joint assembly, and the brush unit. The power unit consists of two steel plates 30" in diameter, mounted on a central 2" shaft and each having 12 chrome leather flaps on its circumference to permit passing obstructions. The universal joint is 18" long and permits the machine to pass bends up to 22½°.

The brush unit is about 4 ft. long overall and consists of a 2 in. diameter steel shaft on which the two brushes are mounted. The whole of this unit is supported in the pipe by means of eight spring steel centralising guides. Eight 1¼ in. x 2 in. water passages have been cut in the brush segments to permit the passage of sufficient water for lubrication purposes and flushing, and also to operate the sound locator incorporated with the brush unit.

The brush consists of two circular ½ in. steel cover plates 2 ft. 4 in. in diameter. Between these two plates are mounted eight brush segments and a cam drum constructed with eight cams, the drum being keyed to the 2 in. diameter shaft which carries the brushes. Each segment is slotted to take the four guide bolts fixed to the back plate of the brush to allow for the travel of the segment required to expand the brush.

The brush segments are made up as follows: two ¼ in. thick backing plates and eight brush plates 1/16 in. thick are used for the assembly of one segment, and the outer periphery of the brush plates is drilled with 14 holes ¼ in. in diameter with a ⅝ in. pitch. Each of these holes contains 72 strands of 22 gauge steel wire bent U shape upwards, the holes containing the wires being drilled out of alignment in alternate plates to give clearance to each bunch of wires, and to ensure a solidly built up series of bristles. Malthoid packing pieces are fitted between each of the eight brush plates to make up for the thickness of the wire and to enable the plates of the segment to be clamped tightly together with three ⅜ in. countersunk screws. The total thickness of the bristles is 2½ in. in width.

The cam section is a fabricated drum with eight built up cams, machined true. These cams give the brush segment a radial travel of 1 in., the whole brush being able therefore to be expanded 2 in. in diameter. When assembled, each brush is a separate unit and may be slipped on to the shaft and firmly held by a 2 in. nut.

To expand the brush after it has become worn, a steel template ring 3 in. wide and of such a diameter as to ensure a tight fit of the brush in the pipe, is slipped over the brush wires. The bolts passing through the backing plates and the slots in the segments are slackened, and the brush is turned in a clockwise direction, the shaft and cam drum being held stationary, until the bristles are bearing hard against the template. The brush is then ready for use after the bolts have been tightened.

The life of this type of brush has been found to be 60 miles or more.

In order to permit continuous location of the brush while it passes through the pipe, a sound locating device was placed between the two pistons and another between the brushes. The former is a wheel 2 ft. 4 in. in diameter mounted on the shaft on ball bearings and vanes cause it to rotate as the water passes through it. As it rotates, a piece of spring steel slides over the teeth of an old gear wheel fixed to the shaft, making a loud vibratory noise. The other sound device has a similar wheel, revolving in a casing and driven by 22 blades set on the periphery at an angle of 45°, and carrying sprinkler alarm type clappers which strike against steel rods fixed to the casing. These could easily be heard on the surface even when the machine was not moving. While cleaning was going on, about a dozen laborers lay at intervals along the pipe line with ears to the ground, and as the machine reached each man he jumped up and went to the end of the line—to the considerable astonishment of uninitiated spectators.

The pipe line was cut in about 50 places, before and after every valve and 45° bend, the length between cuts varying from one-sixth of a mile to over three miles.

After cutting the main, a 15 ft. length of pipe was removed and placed on the side of the trench on a steel lined tray constructed to facilitate the entry of the machine into the pipe, into which it was drawn by a small winch. The pipe was then lowered complete with the machine and fixed into position in the main by mechanical couplings.

# TEN REQUIREMENTS
## FOR UNDERGROUND MAINS
## *under normal conditions*

**Long Life:** In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

**Carrying Capacity:** The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

**Tight Joints:** For *ordinary* pressures, cast iron bell-and-spigot pipe—for *high* pressures, cast iron mechanical joint pipe—are known to be leak-proof.

**Tensile Strength:** When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

**Beam Strength:** Under beam stress tests, 10 ft. span, standard 6" cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

**Toughness:** Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6" cast iron pipe does not crack until the hammer is dropped four feet.

**Internal Pressure:** An average of many internal hydrostatic pressure tests on standard 6" cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

**External Load:** In regulation ring compression tests, standard 6" cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

**Imperviousness:** The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

**Tapping:** Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

**Other pipe materials meet some of these requirements but only cast iron pipe meets them all.**

Whether a pipe material is able to fulfill these requirements is a matter of experience rather than prediction. A page of history is worth a volume of sales claims. History proves that cast iron pipe has been meeting these ten requirements for generations.

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

# CAST IRON PIPE
## *SERVES FOR CENTURIES*


*When writing, we will appreciate your mentioning* **PUBLIC WORKS**

Water was then slowly admitted to the pipe line by operating the nearest valve, and the machine began to move when the pressure built up behind the power unit to approximately 9 lbs. to 10 lbs. per sq. inch. The apparatus therefore required approximately a total force of 4 tons to move it steadily along the pipe, the speed of travel being about 2 feet per second.

The above is condensed from a paper before the South Africa District, Institution of Municipal and County Engineers, by G. H. Lunt, water engineer of Cape Town, and published in the *South African Municipal Magazine*.

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### Tasmania's New Design for Crossing a River

Utilizing the force of a river's current to maintain a pontoon bridge in proper alignment was the novel solution suggested and carried into construction by A. W. Knight, Chief Engineer of the Public Works Department of Hobart, Tasmania, in providing a crossing of the River Derwent, which is 3500 feet wide at this point and flows with a strong current.

It appeared economically impossible to consider any other type of bridge than a pontoon. Yet the cost and impermanence of the many anchorages that would have been needed to keep the multiple pontoon units in proper alignment would have strained the public finances.

All these objections were ultimately avoided when the principles of the arched dam were applied to the project. By utilizing the force of the current, and constructing the pontoons as voussoirs of a horizontal arch, all need for anchorages between abutments was avoided. The force of the current of the river acts in a manner similar to the hydrostatic pressure of the water behind an arch dam, and the pontoons are maintained in alignment on their proper curve without intermediate anchorages.

As far as we know, this solution of a very harassing financial situation—as well as an extremely difficult design and construction problem—is unique in the annals of engineering.

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### Repair of War Damage to Highways

Reimbursement of States for repair of roads damaged by the Army, Navy, or other agencies of the Government is authorized by the Defense Highway Act of 1941 and by Public Law 146, approved July 13, 1943. Notice of intention to claim reimbursement must be given within a reasonable time after damage occurs and careful determination is made of the cost of repairs. Payment can be made only after legislation is enacted authorizing funds to meet approved reimbursement claims for work actually performed. At the end of the year 1944, 545 notices of intent to file claims had been received. Some of these had been investigated and amounts of reimbursement to be recommended to the Bureau of the Budget and others were being considered.

Public Law 288 of April 4, 1944, authorized the Commissioner of Public Roads to use not to exceed $5,000,000 of access road funds to repair and maintain roads in training areas certified by the Secretary of War or the Secretary of the Navy. Two areas, the Tennessee and the Louisiana-Texas maneuver areas, have been certified. Arrangements have been made with counties of Tennessee and the State highway departments of Louisiana and Texas to do the required rehabilitation. From *Fifth Annual Report of Federal Works Agency*.

# Producing Formalin From Sewage Digester Gas

**Experiments conducted by the City of Johannesburg and the Department of Commerce and Industries of South Africa to determine the economic possibilities of such use of digester gas.**

THE following brief description of plant scale experiments was given by Harold Wilson, bio-chemist of Johannesburg, in a paper before the Institution of Municipal and County Engineers, South African District.

In 1940, the staff of the Laboratory Division of the Johannesburg Public Health Department began seriously to consider suggestions made by the writer over very many years, that sludge digester gas might be used as the raw material in the synthesis of certain organic chemicals.

Sludge digester gas consists of about 70 per cent. methane with about 30 per cent. carbon dioxide; the small amount of nitrogen and hydrogen sulphide usually present may be regarded as impurities and the gas is usually saturated with water vapor.

From the usual text-books of organic chemistry it will readily be gathered that methane could, in theory at least, be used as the starting point for the synthesis of a large number of organic compounds. On paper, at least at first sight, the oxidation of methane to formaldehyde according to the reaction

$CH_4 + O_2 = HCOH + H_2O$

Methane + Oxygen = Formaldehyde + Water

looks a simple, attractive proposition.

Now formaldehyde has been in ever-increasing demand for many years, and in South Africa there has been a serious shortage of this compound ever since shipping space became restricted. Formaldehyde in the form of a 40 per cent. (Formalin) solution or as a formalin tablet is used by nearly all municipalities for the disinfection of clothing or textile materials generally. Formaldehyde is an essential constituent for the manufacture of many plastics and artificial resins for which the uses and demand are ever increasing.

Mr. J. A. McLachlan, Deputy Bio-chemist, and Mr. A. H. Meyling, Chemist-in-charge, Klipspruit Sewage Works Laboratory, searched the available literature on the subject of the direct oxidation of methane to formaldehyde. From about 1912 this process has been the object of study and research in Great Britain, U.S.A., France, Germany and later Japan, and several dozen patents have been taken out by experimenters who believed they had discovered commercial processes for this direct oxidation of methane to formaldehyde.

As a result of this search of literature, followed by several months of laboratory work intended to test some of the claims made by investigators, they were forced to the conclusion that the kinetics of the reaction and more especially the instability to formaldehyde at high temperatures renders it practically impossible to obtain more than a minute concentration of formaldehyde in the methane, the amount being of the order of milligrams of formaldehyde per litre of gas. Work done for the Chemistry Co-ordinating Research Board of the Department of Scientific and Industrial Research of Great Britain, and published in 1927 by Messrs. Ledbury and Blair, showed that it was not an economic possibility to concentrate the weak solution of formaldehyde obtained from so minute a yield.

Messrs. McLachlan and Meyling gave up further attempts to directly oxidize methane and turned their attention to the possibility of producing methyl alcohol, which may quite readily be converted to formaldehyde. Methyl alcohol, for long known as wood spirit and obtained by the destructive distillation of wood, has been produced in several countries on a very large scale from the mixture of the gases carbon monoxide and hydrogen by compressing the mixture to more than 100 atmospheres and passing it over catalysts, of which zinc chromite is reported to be the best.

The mixture of carbon monoxide and hydrogen has usually been obtained from water gas derived from coke and steam, and investigations made at the Cydna Laboratory showed that the required mixture could be produced from sludge gas.

It was not until the end of 1943, however, that the Johannesburg City Council was asked by the Department of Commerce and Industries to co-operate with the Department in the provision of a commercial scale pilot plant to produce methyl alcohol and from this, formalin solution on the lines of the experimental work done in the municipal laboratory, in order to relieve the shortage of this essential commodity which has been entirely imported hitherto. The city council voted £ 5,000 for the plant and its initial operation and the Department agreed to help by provision of extra chemical staff (since more than half the municipal laboratory staff are absent on active service) and to facilitate provision of materials.

## Method of Production

The process is briefly:

1. Removal of all traces of sulphur compounds from the sludge digester gas.
2. Addition of the correct amount of water vapor.
3. Passage of the purified and humidified gas over a granular nickel catalyst kept at 950° C., in a gas-heated furnace.
4. The cooled gases are cleansed of all organic impurities by activated carbon.
5. The gases are compressed to 2,500 lbs. per square inch, and then passed over granular zinc chromite, when the mixture of carbon monoxide and hydrogen is converted to methyl alcohol according to the reaction

$CO + 2H_2 = CH_3OH$

Carbon monoxide + Hydrogen = Methyl alcohol

6. Cooling and separation of methyl alcohol from residual gases.
7. Dehydrogenation of methyl alcohol to formaldehyde.
8. Solution of the formaldehyde in water.

It should be understood that the conversion of this correct mixture of gases to methyl alcohol and dehydrogenation of methyl alcohol to formaldehyde are

known reactions which have been operated on very large scales in several countries.

No working details which would really guide beginners in this field of work have ever been published, and it has been necessary to work out afresh each step in the process. The first—low pressure—stages of the process have been erected and operated, but great difficulty has been encountered in securing a tubular converter which will withstand the high temperature (950°), the extremely corrosive effects of both furnace gases and the reacting gases at this high temperature, and be a sufficiently good conductor of heat to transmit the very large amount of heat required for the conversion. Stainless steel has so far given the longest life in operation.

The high-pressure stages of the process are in course of operation. The compressor is a Bellis and Morcom 4-stage double vertical tandem, electrically driven, and water cooled at each stage of compression. It was designed to deliver at 6,000 lbs. per square inch pressure, and was first brought to South Africa for demonstration of the use of compressed sludge digester gas as motor fuel in 1934.

One of the Johannesburg City Engineer's 3-ton lorries was run on sludge gas carried in light steel cylinders, and the results of the trials were given in a paper by J. J. Pollock, B.Sc., Glasgow, to the South African Institute of Engineers in 1935. This compressor was the only high-pressure compressor available in the country and the whole design of the plant is based on the capacity of the input of the compressor, which is 12 cubic feet of free gas at atmospheric pressure per minute.

It is hoped that the output of methyl alcohol will be more than two gallons per hour and this on conversion will give over four gallons of formalin solution per hour. Thus the output of the pilot plant will satisfy some of the most urgent needs for formalin solution, and the experience gained on this plant will enable a decision to be reached on the economic possibility of establishing this process on a large scale in the near future.

## Sewer Rentals in Virginia

The Virginia cities of Fredericksburg, Radford, Richmond, Williamsburg, and Winchester, are financing the construction or operation of their sewerage systems through the collection of service charges. Sewer rentals are imposed on users outside the corporate limits in four other Virginia municipalities.

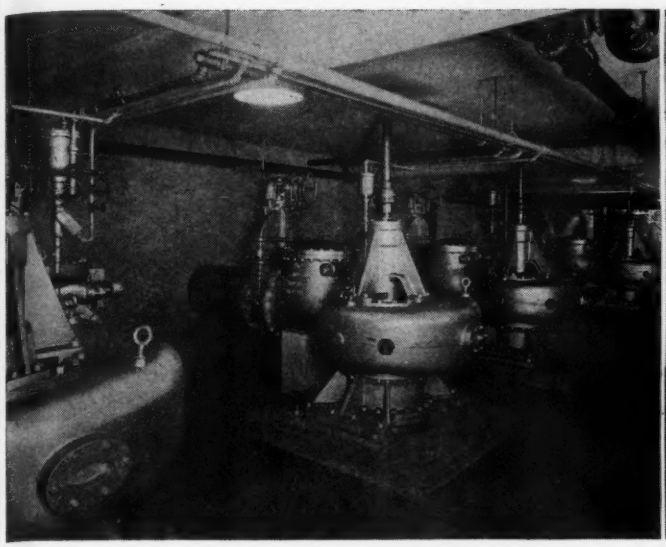
## Government to Provide for Highway Research Extension

In enacting the billion dollar annual program of highway improvement, Congress has authorized the "engineering and economic investigations and highway research necessary". As a consequence of this legislation, the Highway Research Board will greatly increase its employment of field engineers and will more fully support the work of committees.

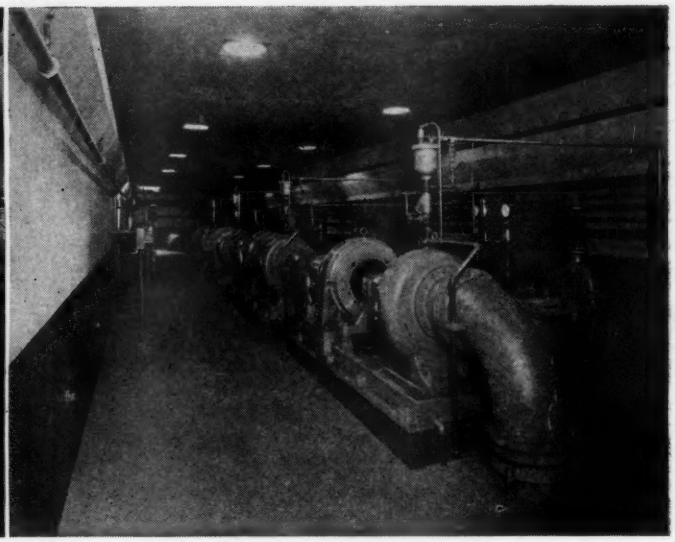
It is expected that the Board's engineers will spend considerable time with the various state highway departments, colleges, and universities acquiring a knowledge of current and past research projects, and will supply technical assistance to research committees. It is not intended, however, to attempt to mould local agencies to a uniform pattern.

The work will be under the immediate charge of Fred Burggraf, Associate Director, and under the general supervision of Roy W. Crum, Director.

# HANDLING 6,000,000,000 GALLONS OF SEWAGE A YEAR IN THE HAMMOND SANITARY DISTRICT



Four Worthington vertical storm water pumps at Hammond's Kennedy Avenue Station



Four Worthington horizontal 16" Mixflo pumps at Hammond's Columbia Avenue Station

To contribute to the protection of the Lake Michigan public water supply, Hammond, Indiana has done a grand job with its Sewage Treatment Works. Tied in with the Works in a comprehensive plan are several intercepting sewer systems, three outlying pumping stations, several pressure mains and the main pumping station.

Designed and constructed under the supervision of Charles H. Hurd, Consulting Engineer, Indianapolis, at a cost of $3,250,000, this plant and system handled and treated 6,375,000,000 gallons of sewage and industrial waste in 1944.

## WORTHINGTON PUMPS SELECTED

Working successfully in the Hammond Sewage Treatment Works and outlying pumping stations are 11 Worthington Centrifugal Pumps as tabulated below:

| NO. | SIZE | G. P. M. | T. D. H. | HP MOTOR | SERVICE | TYPE |
|---|---|---|---|---|---|---|
| 4 | 24MS1 | 14000 | 10 | 60 | Storm Water | V |
| 1 | 8F1 | 2100 | 45 | 40 | Sewage | H |
| 1 | 10FG1 | 2800 | 45 | 50 | Sewage | H |
| 1 | 10FG1 | 3500 | 45 | 60 | Sewage | H |
| 2 | 16MC1 | 5600 | 35 | 60 | Sewage | H |
| 2 | 16MC1 | 5600 | 35 | 60 | Storm Water | H |

One reason why Worthington Pumps and other equipment have won their way into so many sewage treatment plants is that Worthington's diversified line permits impartial advice on the right specifications for your requirements. Ready to give you advice is an engineering staff, strategically located all over the world.

**WRITE FOR BULLETIN W-313-B2**

For specific information about Worthington Axial-Flow and Mixed-Flow Centrifugal Pumps as specified for the Hammond Sewage Treatment Works and other installations, write for Bulletin W-313-B2. Its sectional drawings, rating charts and useful engineering data offer strong evidence that *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, New Jersey.*

**MORE JOBS GO TO WORTHINGTON**

*The complete line... the top engineering*

Centrifugal Pumps

Diesel Sewage Gas Engines

Dual-Fuel Engines

Turbines & Turbo-Generators

Gas Engine-Compressors

Stationary Compressors

Water Softening, Filtering Equipment

Vertical Turbine Pumps

Water Meters

Power Transmission Equipment

Portable Compressors & Air Tools

**WORTHINGTON**

W5-3

When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73

# Refuse Collection in Minnesota

**Present practices of practically all municipalities of that state having more than 1,000 population. Systems of collection, methods, regulations, charges; methods of disposal and costs.**

PRACTICES in refuse collection and disposal in Minnesota municipalities of over 1,000 population were the subject of a questionnaire survey conducted by the League of Minnesota Municipalities, which covered the practices of 121 municipalities in 1944-45, including all of those of over 20,000 population and all but 7 of over 2,500. The information obtained was given in detail by Marvin Iverson, research assistant, Municipal Reference Bureau, University of Minnesota, in *Minnesota Municipalities*. The following is compiled from the data there given.

There are three generally accepted systems of collection:

1. Municipal collection, by city employees with city-owned equipment.
2. Contract collection by private collectors whom the municipality pays to do the work with their own or the city's equipment.
3. The scavenger system, whereby certain individuals are permitted to collect the garbage and rubbish within defined areas of the city and under licenses or regulations of the health department.

All of these methods, including variations, were found to be practiced in Minnesota municipalities.

*Municipal collection.* Of the 121 municipalities replying, 38 report some form of municipal collection of all or part of the refuse. Garbage only is collected by 13 of these municipalities, varying in size from Minneapolis (492,370) to Renville (1,256); in which cities the ashes and rubbish are taken care of by either private scavenger or the property owners themselves.

Municipal collection is compulsory in 20 municipalities; for householders only in 5 of them, for business places, hotels and restaurants in 5, and for all classes in 10. However, most householders and business premises use the municipal service exclusively even where it is not compulsory.

Separate pick-ups for different kinds of refuse were reported by 15 of the 38 using the municipal collection plan, most of these separating garbage from other refuse. Only a few municipalities salvage materials; South St. Paul (11,844) reporting a net loss of $100 by doing so, and Milaca (1,627) $191 net earnings.

*Contract collection* is practiced by 17 municipalities, varying in size from Winona (22,490) to Pine City (1,718); ten of them for garbage only. In 5 the collection is compulsory. Two of the contractors maintain hog farms. In about half the cities the contractor is paid from city revenues, in the others he collects a fee from each party served.

*Scavenger system.* This may be regulated by the municipality through licensing or granting a franchise, 25 using this system, varying in size from Minneapolis to Granite Falls (2,388). Collectors are required to conform to the health or nuisance ordinances, and in some cases to other regulations, such as approval of equipment used. Some places charge license fees varying from $1 to $25, require a surety bond, and public liability or public damage insurance. Private scavengers collect all refuse, with no licensing system, in 64 municipalities varying in size from Duluth (101,065) to Baudette (1017); only 5 of them having more than 10,000 population.

Commercial and industrial establishments sometimes prefer to haul their own refuse, using their own equipment and employees, rather than have it removed by private collectors.

In order to prevent nuisances and to insure public welfare and sanitation, municipalities, through the exercise of police power, have adopted ordinances for some or all of the following:

1. Control of the handling and storage of refuse on private property, including the kind of container that may be used, and provisions against littering private premises. Most Minnesota municipalities require that garbage containers be metal, fly-tight, covered, and have handles. Some limit the size of the garbage container. Specifications for rubbish containers are much more loosely drawn. Usually the only requirement is that rubbish be placed in boxes or some other such container so that it can be picked up readily.
2. Prohibition of the littering of streets or other private areas or the dumping of refuse in such places or on private property unless specifically approved for such purpose by some city official.
3. Prohibition of any practice which may endanger public health, create insanitary conditions, or cause nuisances.

### Comparison of Collection Methods

Commenting on the above, Mr. Iverson says: "Private collection is perhaps the most expensive collection system for the citizens because the collector must not only meet the license fee but also earn a profit. The cost of collection is high and poor people often cannot afford to pay for private collection service. Many families prefer to dispose of their own refuse rather than to pay high charges. With citizens handling and transporting their own refuse, insanitary and littered conditions often result. This means additional cost to the city because increased regulation is necessary.

"Collection by private scavengers is considered impractical for large cities where collection must necessarily be centrally organized. However, for municipalities of 25,000 or smaller, private collection may be satisfactory and efficient, depending on the organization and the enforcement of regulations. Where the number of collectors is small, work is easily supervised and the dangers to public health confined and safeguarded. Nevertheless, the scavenger system is usually an expensive means of refuse collection, and for the larger cities the preference lies between contract and municipal collection.

"A choice between municipal, contract, or private collection is dependent upon the circumstances in the community. None of these plans is a guarantee of good results in itself. According to the Public Works Association survey, good personnel, sound management, and a minimum of political interference in the

*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 71-73*

administration of the operations are given as the factors contributing to success of any of the arrangements. If a high grade of management is possible, municipal collection is preferred, because better community sanitation and appearance, better public relations, and a somewhat more complete service at lower cost is more apt to be secured. However, municipal collection requires adequate equipment and funds to assure successful operation.

"Under contract collection good management methods are likely to be employed and the costs of collection kept at a minimum. However, specifications for contractors must adequately define the duties of operation to assure responsible performance and be sufficiently detailed so that reasonably accurate costs can be estimated in the submitting of bids. Contracts should be made on a "lump sum" basis rather than on a "unit cost" basis and for periods long enough to allow the contractor to provide himself with the necessary equipment to do the collection work efficiently. The contract should contain a cancellation clause to safeguard against improper performance of service. Although private collection is usually the most expensive method, it may be desirable where conditions do not allow proper operation of municipal or contract methods. Private collection may be practical where other methods do not offer complete collection.

"The most efficient collection operation can be secured if the service is placed in one department with an experienced and responsible official in charge. Although the practice in Minnesota as elsewhere has been to place the refuse collection and disposal service in the health department, sanitarians at the present time advise placing it elsewhere. The major reason for this is that health expenditures should have a more direct bearing on public health. However, there is no question that there should be cooperation between the refuse collection organization and the health department.'

### Collection Practices

As to frequency of collection, 74 of the 121 municipalities had specified schedules, a common one requiring collection from residences once a week in winter and twice in summer, and from hotels, restaurants and business places twice a week in winter and daily in summer.

Wrapping of garbage is required by 48 municipalities, and drying by 5.

Collection from the curb is practiced by 9 cities, all less than 25,000 population. In most of the others the back door or alley is prescribed.

In two small municipalities the refuse containers are owned by the municipalities themselves; in two others, part of them are so owned. In the remainder they are privately owned. The collection vehicles are generally trucks of 1 ton to 6 tons capacity. The length of haul averages about two miles.

*Dumping.* Practically all of the municipalities dispose of their ashes and rubbish by dumping, and many of them their garbage also; but garbage is excluded from dumps in 14 cities, including all the largest ones. Precautions against rats and insects at dumps, by either covering or burning or both, were reported in 17 cities. Pine City kills rats by covering the dump with crank case oil and setting it afire. At Willmar, rats are gassed by exhaust from trucks piped to holes in the dump. Dump supervisors are paid $30 to $225 a month. In about half of the municipalities the dumps are fenced in. In most cases the property on which refuse is dumped is owned by the city, but 16 mu-

nicipalities lease it, one paying $125 a year for a gravel pit.

Minneapolis is the only city which charges scavengers fees for the privilege of depositing their collections at the city dumps. Although most municipalities generally grant scavengers the right to deposit collections at the dump free of charge, six require payment by citizens of 10c to 50c a load.

The problem of disposal of crank case oil is solved by 13 cities by selling it to farmers; 11 use it for laying dust in alleys and other road surfaces; 8 burn it; 14 place it on the dump; a few sell it to refiners; Duluth and Mankato use it as fuel, the former at the sewage treatment plant, the latter at the incinerator. Old auto bodies are deposited on the dump by 16 municipalities, and sold by others to dealers in junk or in second-hand auto parts.

*Incineration.* Refuse is incinerated by Duluth, Faribault, Mankato, Minneapolis and St. Cloud; and Ortonville and Montevideo have scheduled incinerators for postwar construction. Duluth last year burned 75,000 tons of refuse, chiefly rubbish, in a 175-ton Nye Odorless incinerator, using no extra fuel, at a total cost of operation of $18,600. Faribault operated its Jones 32-ton incinerator at a cost of $2,573, operating 8 hrs. a day and paying the plant attendant $110 a month. Mankato burned 7967 tons, mostly garbage, in a 90-ton Jones incinerator, operating 8 hr. a day, at a cost of $6,369. Minneapolis used two Minneapolis High Temperature incinerators of 210 and 200 tons capacity, operating 24 hr. a day in summer and 8 hr. in winter, at a total operating cost of $84,865, paying the plant superintendent $307 a month and laborers $177.

No use is made of waste heat except in the Minneapolis plants, where it is used to pre-heat air. The Minneapolis, Mankato and St. Cloud incinerators use forced draught.

*Hog farms* are owned by Rochester and St. Paul, and hog farmers collect garbage in 16 other municipalities. At Rochester's farm last year the revenue was $44,024 and the expenditure $40,434. At St. Paul the revenue and expenditure were $69,060 and $55,126 respectively.

### Financing Refuse Disposal

According to Minnesota Laws 1943, ch. 223, the council of any city of the fourth class or any village, providing by contract or otherwise regular collection and disposal of garbage or other refuse from dwellings or places of business, is authorized to impose a service charge on the owners of all properties served to pay the proportionate costs of the service. If payment of the charge is not made, the council is authorized to levy annually an assessment equal to the unpaid cost against any parcel of land served. The assessment is collected in the same manner as assessment for public improvements. While most municipalities have had implied powers to impose service charges for garbage disposal, collection is often difficult because the charges were not a lien on the property. The 1943 law is especially helpful to municipalities because it provides enforcement machinery for service charges.

Fourteen municipalities finance refuse collection operations by service charges, 9 of which employ the municipal collection system and 4 contract collection. The largest of these is Rochester, 26,312 population; 11 of the 13 are under 9,000 population. Financing out of general revenues is the practice in 39 cities.





When you need special information—consult the classified READER'S SERVICE DEPT., pages 71-73

## RFC Loans for Construction Projects

Loans from Reconstruction Finance Corporation are immediately available to municipalities and other public bodies to aid in financing public construction projects, it was announced last month.

Projects eligible for RFC financing may include the construction or improvement of municipal water supply and distribution systems, sanitary sewage disposal plants, municipal airports, modernization of municipal street car and bus transportation systems, gas and electric systems, and the construction of bridges, tunnels and highways. Also, municipal hospitals, public buildings, school and college buildings, dormitories, public stadiums, and municipal docks and harbor facilities. Municipal borrowers eligible for financial aid under the RFC Act may include cities, towns, villages, counties, States, school and park districts, public boards and commissions, authorities and other public corporations or agencies.

RFC will consider financing up to 100% of the cost of the project, and will cooperate with banks or other lenders in making loans. Loans will in most cases be of the type repayable from the earnings of the project that is financed, such as bridge tolls, water service charges, etc., as may be permitted by State law. This kind of loan is usually made through the purchase of revenue bonds from municipalities. RFC will also purchase bonds payable from general taxes, or payable from special tax receipts such as gasoline taxes.

Under the RFC plan of disbursing loan funds as needed from time to time, instead of all at one time, important interest savings can be achieved while the project is under construction. For example, instead of purchasing a city's entire bond issue at one time, RFC will contract to purchase the city's bonds from time to time over a period of months or years, if necessary, throughout the entire construction period of a large bridge or tunnel or similar project. Thereby the city would save interest costs during construction, since it would be paying interest only on the portion of the loan that is actually outstanding instead of upon the total amount of the authorized bond issue.

The loan commitments may be issued by RFC immediately upon approval of loan applications, and such commitments will remain effective to assure the certainty of funds throughout the full period of construction of the project. Loans will be available for repayment upon a long or short term basis, depending upon what the financial position of the borrower or the project will support. The municipal borrower must be authorized under State law to carry out the project for which RFC financing is given.

Loan application forms or further information may be obtained from the Washington office of the RFC, Self-Liquidating Division, which will process all applications.

RFC also announced publication of a new Circular No. 22 giving information about such loans to public agencies. Copies of such Circular are available upon request at the Washington office of RFC or at any RFC agency in principal cities throughout the country.

RFC made loans of this type aggregating hundreds of million dollars in the prewar days, and a few such loans were also made during the war to assist municipal projects furthering the war effort. It is ex-

pected that this postwar program of financing useful public projects will aid the reconversion program by stimulating reemployment and this will also increase the real wealth of the nation.

The recent lifting of building restrictions and other government controls of construction activity will make possible the carrying out of many needed municipal projects.

## Sale of Surplus War Property to Cities

At a conference on October 18 between the president and the executive director of the U. S. Conference of Mayors, and the administrator of the Surplus Property Administration, the latter gave assurance that every effort would be made to see to it that no further discrimination will take place against cities in connection with the purchase of surplus materials, property and equipment. It is urged that all cities communicate with The United States Conference of Mayors, 730 Jackson Place, Washington, D. C., if they experience any difficulty of any kind in their efforts to purchase required surplus property.

## Honolulu Looks to Its Future Water Supply

Under consideration by the Board of Water Supply of the City and County of Honolulu, T. H. (population in 1941, 204,000 and in 1944, 268,000), is a project for the construction of tunnels intended to recharge the water-bearing strata from which the district's public and private artesian wells draw upwards of 97% of their water supply. At the present time the area obtains most of its water supply from mountain tunnels and springs, supplemented by a recently completed underground pumping station delivering its water to the distribution system through 25,600 ft. of 42 in. water main.

The importance of recharging the strata from which the artesian supply is drawn has been long recognized, and was accentuated by the record-breaking drought of the past few years. By diverting the water of three streams into tunnels drilled into the lavas that form the aquifer of the artesian water structure, it is expected that an additional ten mgd. will become available. Approval has been obtained for the first of these recharging tunnel projects, and work will be started in the very near future.

Also valuable in protecting the underground water supply of Honolulu are two forest reserves. Both lie within the intake or infiltration area feeding the artesian structure, and are to a considerable extent privately owned. The Commissioners of the Board of Agriculture and Forestry have recommended the public ownership of all forest reserves to the end that Honolulu's water supply be not impaired.

## Outstanding Water Bills

"At the close of business Dec. 31, 1944, there are no outstanding water bills over forty-five days in arrears." So reported Wendell M. Hardy, water registrar of the New Bedford, Mass., Water Department. The amount outstanding was less than 1% of the receipts for the year—$389,182. Can any department show a better record?

Incidentally, surplus of revenue over expenditures is turned into "General Funds" and expended for purposes other than water supply. During the past ten years this has amounted to $755,863.

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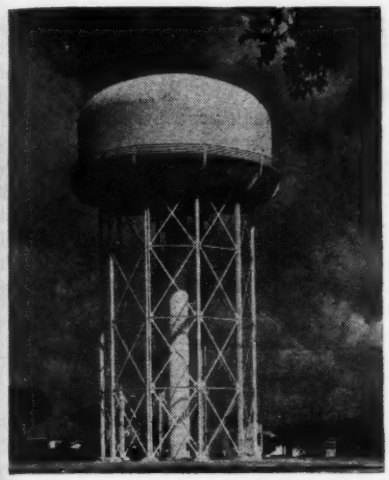


One million gallon radial cone bottom tank at Beaumont, Texas.

# The Waterworks Digest

**Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.**

## Toxic Effect of Sodium Hexametaphosphate

The North Carolina State Laboratory of Hygiene has made various studies of the possibility of the continued use of sodium hexametaphosphate in water treatment injuriously affecting the teeth, bones or calcium equilibrium of the body of those drinking the water.

Their conclusions are that there are no such deleterious effects. In fact, in view of the claim that there are fewer dental troubles in communities drinking hard water than in those having soft water and that some iron in food is desirable, it suggests that, instead of removing hardness and iron to prevent pipe damage and red water, this chemical be added to the water to prevent the objectionable actions of calcium, magnesium and iron.[X5]

## Structural Features of T. V. A. Dams

In building concrete dams, TVA provided elaborate cutoff grouting systems in the foundation to prevent seepage and uplift beneath the structure. Free contraction joints were provided in gravity dams, relying on duplicate metal seals for water tightness. To minimize cracks due to temperature changes during setting, they used a low content of low-heat cement; poured in horizontal layers about 2.5 ft. thick, which were left uncovered for 2 or 3 days; and in some dams circulated cold water through pipes imbedded in the concrete.

In earth dams, the upstream face was made watertight, with provision that such water as entered the dam could escape readily through a continuous drain at the toe of the dam and occasional wells draining into this toe drain. Hydraulic fill was used in only one dam, since this can be placed in almost any weather while rolled fill is possible only in a dry season.[K8]

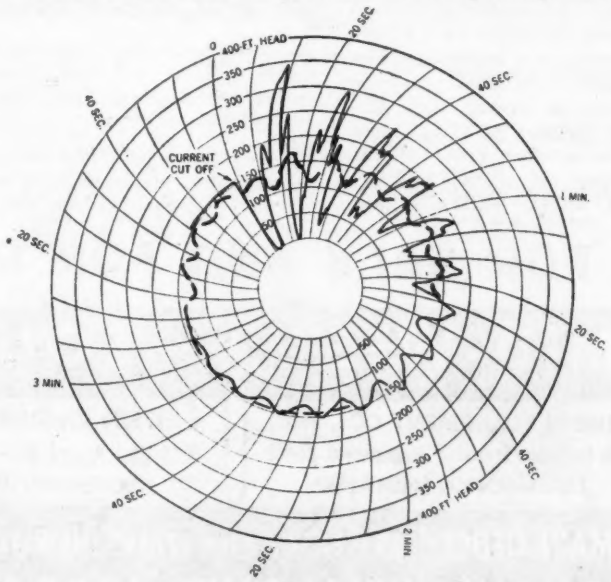
## Control of Surge in Pipelines

High pressures in pipe lines are caused by changes in velocity of water, caused by stopping of the pump, failure of electric power, starting the pump, sudden opening or closing of a sluice valve, slamming of a check valve after the pump has been stopped, or formation of a partial vacuum at some high point of the pipe line following a shut-down. The diagram shows the fluctuations in pressure near a motor-driven pump when this was stopped. It also shows the pressure fluctuations when a motor-driven sluice valve was in operation. This valve was given a closing time of 3 minutes. When stopping the pump, this valve first was closed and when almost completely shut it automatically stopped the pump, thus retarding the water column slowly. The result is shown by the other line on the diagram. Slower change in water velocity may be obtained by attaching a fly-wheel to the pump shaft; by using a delayed-action stop-start electrical device, which causes the speed of the pump motor to change slowly; and less effectively by a pressure relief valve. A surge suppressor can be used where sub-normal pressures occur before the pressure rise; used in some cases for heads up to 3,000 ft. Other devices are an air vessel, surge tower and surge tank. Another, the surge buffer, which is inserted in the pipe line close to the pump, is a development of the tower but is closed at the top, where there is an air valve, which admits air when the low pressure in the pipe occurs, and closes on the return surge causing the air in the cylinder to form a cushion. After the surging ceases, the contained air escapes slowly through a small aperature.[A110]

## Chlorine Dioxide Treatment of Water

Based on experiences with its use in several cities and on experimental work at the Lawrence Experiment Station, the following conclusions have been reached:

"Treatment of water supplies with chlorine dioxide can result in satisfactory removal of tastes and odors. Each supply so treated will probably require individual study, and success will be obtained only if optimum dosages, which may be high, are used. Due to oxidation of pipe slimes, tastes and odors may be increased temporarily until




**Full line—Pressure fluctuations with uncontrolled surge. Dotted line, with surge control.**

equilibrium is reached. Thenceforth, the treatment should have a beneficial effect on distribution systems.

"Disinfection must be separated from odor treatment and should generally be completed before the application of dioxide; otherwise very high residuals must be carried.

"Waters treated with dioxide will carry a high residual of chlorine without creating taste problems.

"Operating costs, on the basis of our present studies, will probably be somewhat greater than costs of super-chlorination, and somewhat less than costs of activated carbon."

### Coagulation Basins At Omaha, Nebraska

Water consumption in Omaha, Neb. increased from about 10,000 mg in 1938 to 12,073 mg in 1943. The turbidity of the raw water reaches 32,000 ppm in the spring, and the capacity of the six sedimentation basins (none of which is equipped for mechanical sludge removal) became insufficient with the increased consumption. Lime and alum were used for coagulation, at the rate of 57 lb. and 124 lb. respectively, per mg in 1939, and 185 and 342 lb. in 1943. To improve conditions, mixing basins were constructed on both the primary and secondary coagulation processes, the former 32 x 225 x 12 ft., the latter 60 x 168 x 10 ft. These were completed in April 1945, and the use of chemicals dropped to 56 lb. of lime and 111 lb. of alum in May, and 55 and 101 lb., respectively, in June, although the turbidity of the river water reached 15,000 ppm in June.[J17]

### Reducing Chemical Odors

The water supply of Nitro, W. Va., is taken from the Kanawha river, which receives the wastes from numerous large chemical plants and always has some odor and at times the threshold odor exceeds 6,000. The lowest reached during the past two years was 19.

Prior to 1943 aeration and activated carbon controlled the odor fairly well, but the opening of synthetic rubber and butadiene plants increased the odor number and changed its character to ones like varnish and mustard. Breakpoint chlorination, using up to 46 ppm, had no beneficial effect. Activated carbon was tried up to 855 ppm, but excess beyond about 150 to 200 ppm had little effect. It was found that granular activated carbon filters are valuable in reducing the last fraction of odor after the bulk has been reduced by aeration.

Aeration by high pressure gave by far the best results, removing up to 98% by a single aeration at 110 psi at the nozzle, and 91% at 55 psi. A test of second aeration gave 73%, or a total of 97.6% at 55 psi. Aerating at 55 psi was calculated to cost less than applying 17 ppm of activated carbon.

The aerator used was designed by J. R. Peck, the engineer in charge of the plant. It consists of thirty No. 11-BA 2" "Spraco" nozzles arranged along a pipe which decreases in calculated steps from 18" to 8", so that practically the same pressure is found at all nozzles. Treating aerated water with activated carbon further reduced the odor to 2.5-5.0.

It was found that aeration does not greatly reduce the residual chlorine in water.

A few tests were run to see if the diffusion vanes, or turbine center, of the nozzle could be inverted or eliminated. Little or no change in threshold odor was found to occur when the turbine center was reversed. At about 90 psi the same reduction was observed with the turbine center removed as with it in.

On very cold days the Nitro aerator cannot be used because of the ice which builds up around it. Fortunately there are few days cold enough to cause trouble at Nitro and the river water is usually not so odorous during freezing weather.

"It must not be assumed that the same results can be obtained with odors of other types."[A107]

## *Bibliography of Waterworks Literature*

***The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.***

*c.* indicates construction article; *n.* note or short article; *p.* paper before a society (complete or abstract); *t.* technical article.

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104. Transformations of Iron by Bacteria in Water. By Robert L. Starkey. Pp. 963-984.
105. Trends in Water Laboratory Practice. By D. W. Graham. Pp. 985-1001.
106. Development and Practice of Municipal Water Softening. By H. M. Olson. Pp. 1002-1012.
107. Reduction of Chemical Odors at Nitro, W. Va. By Lawson Haynes and Wallace Grant. Pp. 1013-1020.
108. Re-employment of Servicemen. Pp. 1021-1028.
109. Centrifugal Pump Peculiarities. By Robert W. Angus. Pp. 1029-1035.
110. Control of Surge in Pipelines. By Charles F. Lapworth. Pp. 1036-1041.
111. Customers' Complaints as a Guide to Better Service. By M. Warren Cowles. Pp. 1042-1047.
112. Politics and Public Service. By Willard Chevalier. Pp. 1048-1049.
113. Promotion of Fraudulent Water Purifiers. Pp. 1050-1052.
114. Elimination of Midge Fly Larvae with DDT. By Martin Flentje. P. 1053.
115. Alexandria, Va., Survival and Retirement Experiences with Water Work Facilities. Pp. 1054-1068.
116. Winnipeg, Manitoba, Survival and Retirement Experience. Pp. 1069-1108.

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33. Military Use of Public Water Supplies. By Robert N. Clark. Pp. 237-243.
34. False Presumptive Tests From Water Treated With Chlorine Ammonia. By James E. Fuller and Chas. K. Ewing. Pp. 244-251.
35. Chlorine Dioxide for the Treatment of Water Supplies. By Joseph A. McCarthy. Pp. 252-264.
36. Developments in Electronic Instrumentation. By D. M. Nielsen. Pp. 265-272.
37. Analysis of Flow in Pipe Network by Method of Balancing Flows. By Clarence E. Carter and Scott Keith. Pp. 273-284.
38. Rainfall and Yield of Watersheds in New England. Committee report. Pp. 285-323.

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59. *c.* "Wildcatting" Water Wells on Iwo Jima. By R. P. Day. Pp. 1102-1104.
60. Tests at Omaha, Nebr., Cast Doubt on Valve of Certain Media. By Delia Johnson. Pp. 1105-1107.
61. *p.* Pipeline Capacity Restored by Chlorine and Pipe Cleaning. By M. E. Rogers. Pp. 1113-1114.
62. Hardness of Water and Saving by Softening. Pp. 1115-1116.

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63. Cooperation the Watchword of This State Health Board. By I. M. Jarrett. Pp. 1146-1148.
64. Softening Water by the Lime-Soda-Ash Process. Pp. 1156-1172.

J *American City*
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17. Coagulation Basins Improve Reduction of Turbidity. By John C. Detwieler. Pp. 105-106.
18. Improving Taste of Water at Monroe City, Mo. By F. B. Bridges. Pp. 117-118.

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6. More Water for San Diego. By Fred D. Pyle. Pp. 443-446.

M *Water Works and Sewerage*
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15. Kingston Filter Plant and Intake. Pp. 21-24, 50.

P *Public Works*
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34. Measuring Well Discharge Without Wasting Water. By T. H. Sauter. Pp. 18-19.
35. Feeding Activated Carbon in Three Cities. Pp. 30-31.
36. *n.* Chlorination Removes Pipe Line Growths. P. 40.
37. *n.* Responsibility for Water Meter Boxes and Excavations. P. 40.

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4. A Study of the Chlorine-Ammonia Nitrogen Reaction. By John N. Lesslie, Jr. Pp. 31-53.
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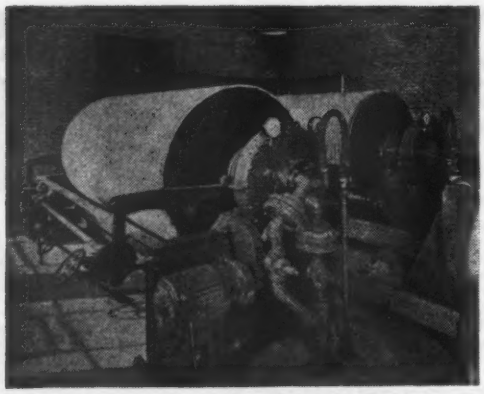


Vacuum filters at Cuyahoga Falls, Ohio

# The Sewerage Digest

**Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.**

## Industrial Waste Problems

Wool wastes in Los Angeles County, California, particularly those from sodium sulfide vats, threatened the destruction of sewers into which they were discharged and the Sanitation Districts persuaded the offenders to return the strongest sulfide solutions back to the plant and treat the rest with ferrous sulfate. By doing this, the value of the amount of sodium sulfide salvaged exceeds the cost of neutralizing the amount wasted.[H46]

Industry generally is not throwing away valuable materials in its wastes—modern business efficiency prevents this. True, some manufacturers waste a moderate amount of useful materials, but in the vast majority of cases it is substantially cheaper to waste such substances than to attempt their salvage.

A stream should be regarded as a chemical and biological treatment plant which functions satisfactorily as long as it is not overloaded. As the national economy is based to a considerable extent on effective use of streams, they should be employed where necessary at optimum capacity for waste disposal. This means that wastes should be treated only to such a degree before discharge that stream ecology will rarely be disturbed, and then only for brief periods.[H48]

Waste water from paper mills, when stored in lagoons for 10 to 15 days, dropped in BOD as much as 90%; the clear water could be re-used in the mill; and by regulating the rate of discharge of waste from lagoons to stream flow and its DO content, lagoon storage of the entire waste is practicable. In some cases the fibre recovered by sedimentation can be used in a lower grade of paper. The capacity of the stream to assimilate pollution can be increased greatly by diffusing air into it.[H49]

Believing that disposal of industrial wastes discharged from the industrial plants should not interfere with the welfare of the community, the writer is of the opinion that it should receive disposal into the sewers, but that, in so doing, the industries should pay for the excess loading which such wastes will cause, not only in the sewage collecting system, but also at the sewage treatment plant of the governmental agencies. It is accordingly recommended that this excess loading shall be that which is over and above the loading which would be caused by the disposal of domestic sewage into the collecting system and thence into the sewage treatment plant.[H53]

## "Economized" Activated Sludge Treatment

The effect of reducing detention time, air consumption and mixed liquor concentration in the Ley Creek activated sludge plant of Syracuse, N. Y., has been studied for a three-month period, with interesting results. The plant was designed for treating 4.5 mgd, but during the test it treated 6.75 mgd; reduced the air supplied to 0.5 cu. ft. per gal., or ⅓ to ½ the design basis; return sludge suspended solids were reduced to 8,000-12,000 ppm; mixed liquor solids were reduced to 1500-1800 ppm, and the amount of activated sludge returned to aerators to 15% to 20%. Costs of power for air and pumping return sludge were consequently reduced considerably.

In general, the results of such operation were as good as, and in some ways better than, operation on a conventional basis according to design factors. The system appeared to stand industrial shocks better and recovered faster. It is possible with this plant to direct final tank effluent back to incoming sewage, a step that would most likely be used for a severe case of shock to the process.

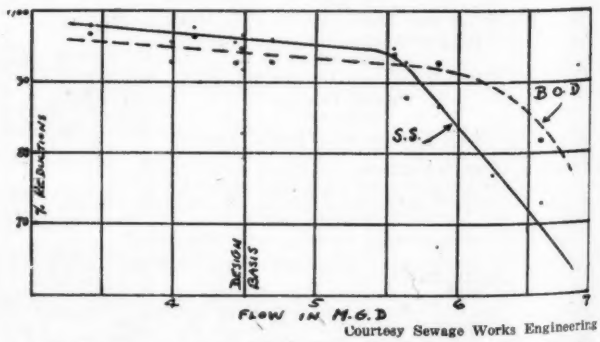
More than 50% of the time during this study, the per cent solids were higher with the lower concentration of solids, which seems to be contrary to the results obtained by several other plants.

Attempts to concentrate final tank sludge have not met with much success to date. At times when waste activated sludge would run 1% solids it was possible to settle mixed liquor in a cylinder to 3% solids.[H55]

## Laundering Air Diffuser Plates

The air diffuser plates at the Wards Island (New York) treatment plant, which went into operation in October 1937, became clogged in less than two years and, in spite of laundering, the clogging has become worse year by year, and the usual treatment by brushing and caustic soda is no longer satisfactory. As the plates are permanently grouted into place, they can not be removed for cleaning. Laboratory tests were made in an effort to find a more efficient means of cleaning. Treatment with chromic-sulfuric acid, sodium hydroxide, or burning alone was unsatisfactory. It was found that treatment with chromic-sulphuric acid or caustic soda supplemented by air blowing of the plates when dry restores much of the permeability if the plates are not too badly clogged. However, the use of chromic-sulfuric acid on plates grouted into place with concrete is impracticable.

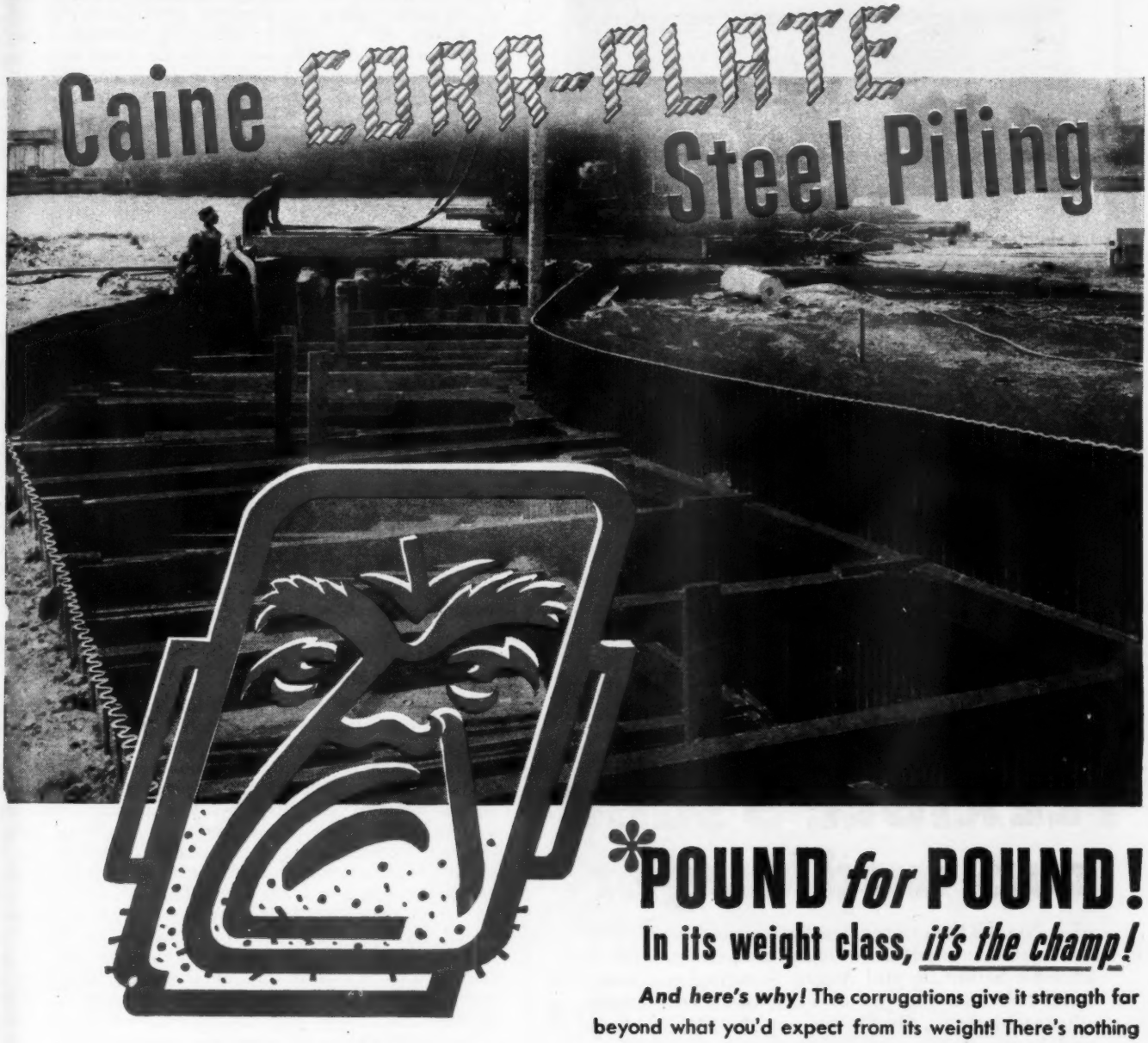
When plates are badly clogged at the top and bottom, vacuum water wash of the top of caustic-treated plates followed by blowing the dried plates at a pressure of about 2 psi for 5 to 18 hours was successful in restoring permeability; vacuum water wash removed the sandy ma-




Courtesy Sewage Works Engineering

**Relation between flow and percent reduction of suspended solids and of B.O.D.**

# TOUGHEST* OF THEM ALL IS

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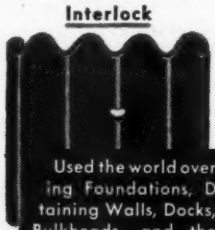

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terial from the top of the plate and the air blew out or redistributed the clogging material at the bottom. In vacuum water washing, vacuum at 12" to 22" of mercury (equivalent to 6 to 10 psi) is applied to the top surface of the plate without touching the grouting (which would be blown out at 2 psi); meantime sufficient water is added to keep the plate saturated, the water acting as a carrier in the removal of the clogging material and lessening the loss of vacuum around the nozzle that applies it.[C75]

### Preheating Sludge for Digestion

Plans for New York City's Hunts Point sewage plant provide for treating 120 mgd and include four digesters. These will not contain heating coils, but instead the sludge will be heated before it enters the tanks by passing through heat exchangers, utilizing heat from engine cooling water and exhaust gases.

Each exchanger consists of a vertical bank of five 6" pipes, connected at the ends by return bends, and enclosed in 8" pipes. The sludge passes through the 6" pipes, while hot water flows in the opposite direction between the 6" and 8" pipes. The water will enter at 138° and emerge at 118°, while the temperature of the sludge will be raised from 50° to 108°. The hot water is obtained by recovery of heat from the gas engine jacket cooling water, supplemented when necessary by heat from the engine exhaust gases. The exchanger pipes will all be of aluminum because it resists corrosion. Heat loss from the digestion tanks will be reduced by an insulating air space between the tank walls and the brick veneer architectural wall, and by insulation on the roofs.[E9]

### Digestion Tank Supernatant

Due to its high BOD and solids content and probably to the specific nature of its bacterial flora, supernatant liquor has a tendency to cause disturbance of primary settling tanks, increasing the moisture content of the sludge and thus increasing the quantity of supernatant and pyramiding the difficulty. The primary consideration in reducing the excess digester liquor is to increase the solids concentration of the sludge added to the digester. Digestion tanks may be expected to receive sludge containing 4 to 6% solids from plain sedimentation, 3 to 4% from a trickling filter secondary tank, 2 to 3% from mixed sedimentation and activated sludge, and 5% from chemical precipitation. The solids content can be decreased by decreasing the duration and frequency of pumping raw sludge. No limit has been found to the thickness of sludge that can be digested satisfactorily. Concentration units are sometimes advantageous. So far, means have not been devised that are uniformly effective in satisfactorily concentrating the solids in waste activated sludge.

A satisfactory system for withdrawing supernatant should provide for continuous or long-period removal, at a low rate of flow, of the best liquor, regardless of its location. Supernatant has been disposed of in several ways—return to the raw sewage, discharge onto drying beds, chemical coagulation and settling, sedimentation, aeration, centrifuging, and lagooning. Sedimentation may be aided by removing adhering and entrained gases, as by atomized aeration.[C77]

## *Bibliography of Sewerage Literature*

***The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.***

*c.* indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

C *Sewage Works Journal*
*September*

75. Experimental Laundering of Air Diffuser Plates. By L. R. Setter and G. P. Edwards. Pp. 867-877.
76. Porous Tube Air Diffusers. By Frank C. Roe. Pp. 878-888.
77. Treatment and Disposal of Digestion Tank Supernatant Liquor. By C. V. Erickson. Pp. 889-906.

78. Use of Charts in the Analysis of Sewage Treatment Plant Operation. By W. Vincent Barry. Pp. 907-916.
79. Installation and Maintenance of Sewer Connections. By Nicol MacNicol. Pp. 917-923.
80. A Useful Technic in Groundwater Infiltration Studies. By Charles A. McLoughlin. Pp. 924-928.
81. Trickling Filters—Past, Present and Future. By E. Sherman Chase. Pp. 929-939.
82. Treatment and Disposal of Spent Pickling Liquors. By Richard D. Hoak. Pp. 940-951.
83. Freezing as a Factor in the Stabilization of Corn Cannery Wastes. By P. W. Rildesee and W. R. Lawson. Pp. 952-965.
84. Effect of Polysulfide Treated Cyanide Case Hardening, Copper and Zinc Plating Wastes on Sludge Digestion. By G. M. Ridenour, R. D. Backus and Corrina Sherron. Pp. 966-978.
85. The Reasons for Sewage Treatment and the Responsibilities of the Operator. By H. E. Moses. Pp. 980-984.
86. Characteristics of Sewage. By Harry W. Gehin. Pp. 984-987.
87. Sewage Treatment Processes and Results. By Linn H. Enslow and George E. Symons. Pp. 987-995.
88. The Care and Operation of Imhoff Tanks. By P. N. Daniels. Pp. 995-1000.
89. Operation of Intermittent Sand Filters. By Francis E. Daniels. Pp. 1001-1006.

D *The Surveyor*
*September 7*

29. Sanitation and Town Planning. By James F. Maclaren. Pp. 513-515.

*September 21*

30. Sludge Treatment at Small Sewage Works. By L. B. Escritt. Pp. 547-548.

*September 28*

31. *p.* Darlington Sewage Works and Farm. By W. Oliver. Pp. 567-568.

*October 5*

32. *p.* Surface Water Sewer Design. By G. S. Short. Pp. 583-585.
33. *p.* Sewerage and Sewage Disposal in Retrospect and Prospect. By M. Lovett. Pp. 587-590.

E *Engineering News-Record*
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7. *c.* Seabees Make Materials for Guam Sewer. By Harold W. Richardson. Pp. 117-120.
8. London Sewage Disposal Facilities After a Century of Time and Two Wars. By M. N. Baker. Pp. 121-122.
9. Sludge Preheating Is Featured in New York's Sewage Plant Design. Pp. 123-126.
10. Indiana Cities and Industries Share Costs of Sewage Disposal Service. P. 126.

H *Sewage Works Engineering*
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45. Plain Talk About Industrial Wastes Recovery. By F. W. Mohlman. Pp. 489-490.
46. Sulfide Wool Wastes Endanger Sewer System. By A. M. Rawn. Pp. 491-493.
47. Industrial Wastes Equivalent to 60 Million Population. By J. K. Hoskins. P. 493.
48. Whither Industrial Waste Treatment? By Richard D. Hoak. Pp. 494-495.
49. Trends in Handling Pulp and Paper Mill Waste. By Harry W. Gehm. Pp. 496-497, 528.
50. Garbage Treatment Would Cost 55 Cents Per Household Grinder. By G. J. Schroepfer. Pp. 498-500.
51. Biological Treatment of Soluble Organic Wastes. By Willem Rudolfs. Pp. 501-502.
52. Industrial Wastes Interfere With Treatment Processes. By Don E. Bloodgood. Pp. 503-504, 526.
53. *p.* Industry Should Pay for Waste Treatment. By W. T. Knowlton. Pp. 505-506.
54. Treatment and Recovery of Textile Wastes. By John C. Geyer and Wm. A. Perry. Pp. 507-508.
55. Economized Activated Sludge Tests Are Promising. By Uhl T. Mann. Pp. 513-517.
56. The Control of Sewage Plant Odors. Pp. 519-520.

J *American City*
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12. Water Pollution Damage and Correction. By M. LeBosquet, Jr. Pp. 100-102, 125.

L *Civil Engineering*
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4. Army Sewerage in Hawaii. By Belden S. Tucker. Pp. 473-475.
5. Design of Sewer or Drains for Greatest Economy. By W. E. Howland. Pp. 477-478.

M *Water and Sewage*
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13. Experiences in Winter Operation of Sewage Filters. By J. C. D. Taylor. Pp. 26-28, 45.
14. *p.* Effect of Heavy Doses of Chlorine in Sewage. By A. E. Griffin and N. S. Chamberlin. Pp. 29-31, 55.

P *Public Works*
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46. Designing Sewage Settling Tanks. By M. B. Tark. Pp. 15-17, 46.
47. Operation of Screens, Grit Chambers and Sedimentation Basins. By R. C. Merz. Pp. 21-24, 58.
48. *p.* Lay-Out of Sewage Treatment Works. By L. B. Escritt. Pp. 27-28, 64.
49. The New Jersey-New York-Connecticut Interstate Sanitation Commission. Pp. 34, 36.
50. *n.* Sewer Charges in St. Paul. P. 36.

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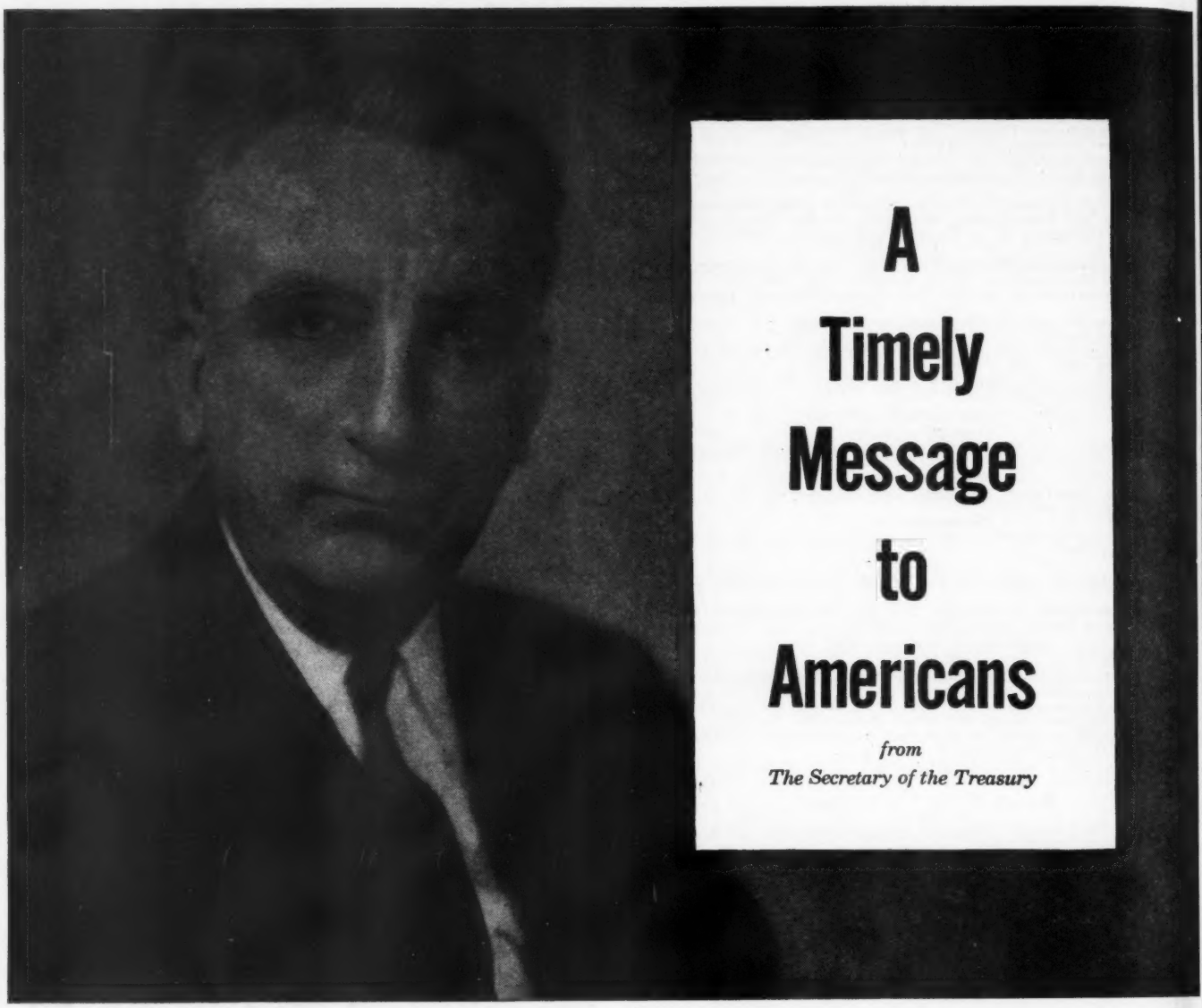
8. Using a Control Factor for Successful Chemical Precipitation of Textile Dye Wastes. By H. D. Fesperman. Pp. 81-88.
9. History of the Hampton Roads Sanitation District Commission. By R. W. Digges. Pp. 89-95.
10. Activities, Reorganization, and Future Policies of the Division of Sanitary Engineering. By J. M. Jarrett. Pp. 96-102.



# A Timely Message to Americans

*from*
*The Secretary of the Treasury*

**America has much to be thankful for.**

Abroad we have overcome enemies whose strength not long ago sent a shudder of fear throughout the world.

At home we have checked an enemy that would have impaired our economy and our American way of life. That enemy was inflation—runaway prices.

The credit for this achievement, like the credit for military victory, belongs to the people.

You—the individual American citizen—have kept our economy strong in the face of the greatest inflationary threat this nation ever faced.

You did it by simple, everyday acts of good citizenship.

You put, on the average, nearly one-fourth of your income into War Bonds and other savings. The 85,000,000 owners of War Bonds not only helped pay the costs of war, but also contributed greatly to a stable, prosperous postwar nation.

You, the individual American citizen, also helped by cooperation with rationing, price and wage controls, by exercising restraint in your buying and by accepting high wartime taxes.

All those things relieved the pressure on prices.

## THE TASK AHEAD

We now set our faces toward this future: a prosperous, stable postwar America—an America with jobs and an opportunity for all.

To achieve this we must steer a firm course between an inflationary price rise such as followed World War I and a deflation that might mean prolonged unemployment. Prices rose more sharply after the last war than they did during the conflict and paved the way for the depression that followed—a depression which meant unemployment, business failures and farm foreclosures for many.

Today *you* can help steer our course toward a prosperous America:

—by buying all the Victory Bonds you can afford *and by holding on to the War Bonds you now have*

—by cooperating with such price, rationing and other controls as may be necessary for a while longer

—by continuing to exercise patience and good sense with high faith in our future.

The challenge to America of switching from war to peace with a minimum of clashing gears is a big one.

But it is a small one compared to the tasks this nation has accomplished since Sunday, December 7, 1941.

Fred M. Vinson
*Secretary of the Treasury*

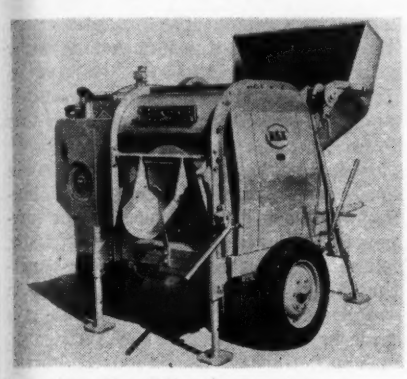
A Government messa, e prepared by the War Advertising Council and contributed by this magazine in cooperation with t'e Mag zi e Publishers of America.

# Keeping Up With New Equipment

## A Streamlined Concrete Mixer

Concrete mixers go streamlined with the announcement of Chain Belt Company's line of Rex mixers!

First to be in actual production is the new Rex 6s. Features include a completely redesigned chassis—low overall height, wide wheel tread and low center of gravity. Thus, the machine is easy to park, tow and spot. New convenient controls, grouped on one side of the machine, a new water system and new drum design result in easier operation and better mixing qualities.



New Rex 165 concrete mixer.

The redesigned 11 and 16S meet the new A.G.C. standards. The 11S is available in either a 2 or 4 wheel mount —end discharge type. The 16S is mounted on a 4 wheel chassis—side or end discharge types. Improvements include the relocating of lubrication fittings so they are all available for convenient greasing—choice of air and water cooled motors, redesigned water system and a new slip-stream shimmy skip.

## The New Denco 180° Open End Ratchet Wrench

Sole distributor rights east of the Mississippi River for the new 180° Denco open end ratchet wrench have been obtained by Northrop & Co., Inc., 50 Church Street, New York, N. Y.

This wrench is especially designed for connecting and disconnecting water meter coupling nuts. It is made in sizes to fit 5/8", 3/4" and 1" meter couplings and the head may be set at any angle. A whole half turn of the nut (180°) may be made without removing the head from the nut.

The Denco wrench is manufactured by the Denco Sales Company of Glendale, Calif., who distributes them west of the Mississippi. Northrop & Company will keep a stock at all times for immediate shipment east of the Mississippi River.

## DAREX AEA, an Air Entraining Agent

DAREX AEA is a water soluble compound that comes ready to use and has the property of controlling the amount of entrained air. In addition a catalyst which is incorporated in DAREX AEA makes available more of the inherent strength of cement thereby minimizing the loss in strength resulting from entrained air.

This catalyst — triethanolamine — is the same as that used in TDA which has been proved in over one hundred million lbs. of cement in the last ten years.

The manufacturer says that DAREX AEA is the result of intensive research by the same staff that developed TDA and was designed for a companion product.

TDA has been used by the manufacturers of Portland Cement for over 15 years and its use is confined to that industry. However, DAREX AEA is available to those responsible for design and construction of concrete pavements and other concrete structures.



*When you need special information—consult the classified* READER'S SERVICE DEPT., *pages 71-73*

Dewey & Almy, Cambridge 40, Mass., the manufacturer of DAREX AEA will be glad to send a copy of the Manual for using that product to those who are interested.

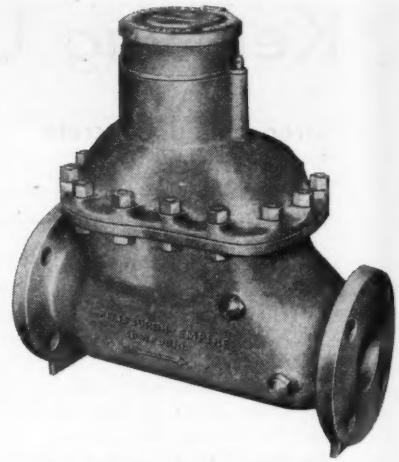
## New Compound Meter

The Pittsburgh Equitable Meter Company, Pittsburgh, Pa., has announced their new line of Pittsburgh-Empire Compound Water Meters. It is said that these meters have a number of exclusive advantages.

The Pittsburgh-Empire Compound has but a single register which, through use of an over-riding clutch coordinator, records the flows of both the velocity and displacement measuring units. The manufacturer states that by having only one register instead of the conventional two, meter reading is speeded and errors are eliminated.

The interior design includes a horizontally positioned propeller with shaft mounted on hard rubber roller bearings, and a full-opening, swing action valve with compensating linkage, thereby providing a straight-through passageway for large volume flows. This combination is said to provide a remarkably low head loss.

An Empire oscillating piston meter is used to measure flow rates below the accurate capacity of the propeller unit. The Empire piston meter is mounted immediately above the propeller cage. Both velocity and displacement meter units operate at all flow rates and accordingly, it is stated, there is no detectable accuracy drop at the change-over point.



Pittsburgh-Empire compound meter.

According to the manufacturer, the space conserving arrangement of interior parts has been engineered for service case and accessibility. Size for size, company spokesmen say the Pittsburgh-Empire is much smaller and lighter in weight than previous compounds. It is made in a complete range of sizes.

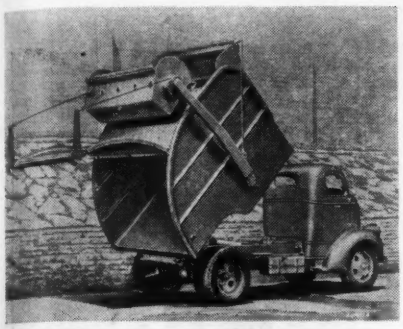
A bulletin has been prepared describing the features of this new meter. Those interested should write Pittsburgh Equitable Meter Company, 400 N. Lexington Avenue, Pittsburgh 8, Pa., and ask for bulletin W-803.

## New Colecto-Pak Refuse Unit Efficient

*The Heil Co.*
*3000 Montana St.*
*Milwaukee, Wisc.*

A new type of refuse truck body and hoist which promises to make municipal garbage collection much more healthful and efficient has recently been introduced by the Heil Co. The unit is called Colecto-Pak because it not only loads and dumps the wrapped garbage, but packs or compresses it as well. The trimly designed, fully enclosed steel body is water tight and is specially constructed for stresses and strains so as to cut weight to a minimum without any decrease in strength.

A feature of the new Colecto-Pak is the traveling ¾ yard receiving bucket into which the individual garbage cans are emptied. The top of the bucket is only 35″ from the ground, permitting easy, efficient, waist-high loading. When the bucket is loaded, a buzzer signals the driver who engages the power take-off by means of a lever in the cab, and hydraulic cylinders lift the bucket smoothly to the top of the body, the top panel opens and the load is dumped inside. The raising and lowering operation of the bucket takes less than a minute, occurs about twenty times per load. The bucket may be operated when the truck is stationary or in motion.



**Colecto-Pak refuse unit.**

As the double-acting cylinders bring the bucket back to its loading position, a 5′ x 7′ steel compressor plate automatically moves forward under hydraulic pressure and packs the load toward the rear of the body. This front packer plate or compressor enables the operator to carry 20 cubic yards of wrapped garbage in a 10 cubic yard body, doubling the normal capacity of a standard body. Colecto-Pak is available in 8 yard, 10 yard, and 13 yard body sizes. Heil Co. will send more complete description upon request.

## A New Program Device for Traffic Control Systems

*General Electric Company*
*Schenectady 5*
*New York*

A new program device which permits changes in timing of traffic control systems as often as every twelve minutes a day for six days without repetition, has been announced by this company. This device supervises the functions of the master controller in an interconnected traffic control system and can be furnished to take care of any desired number of circuits. The minimum adjustment of twelve minutes is considerably less than that obtainable with the usual time switch method.

With a six-circuit device, a selection of three resets, three cycle changes, and three dials can be made — a total of twenty-seven combinations. Dial number one operates when both dial circuits are turned off, and dials two and three come into operation when their respective circuits are turned on. Selection of resets and cycle changes are made in the same manner.

The device has a weekly program cylinder which permits the six different programs to be spread out over a weekly period by making one of the programs do for two days. In addition, a program which takes into account seasonal, special events, and holiday variations in traffic conditions can be set up twelve weeks in advance on the weekly cylinder.

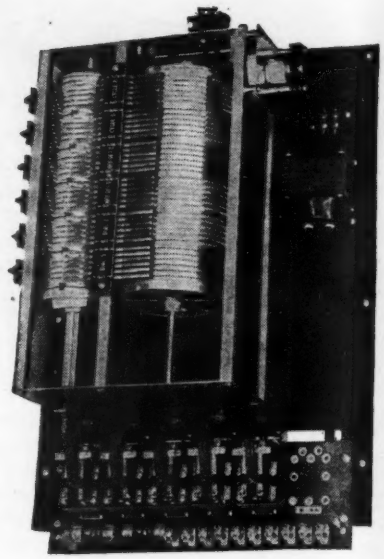
To obtain any desired program, the pins are placed in the correct holes on the daily and weekly cylinders. The time during which it is desired to have this circuit energized is on the large daily program cylinder, which moves at the rate of one revolution every twenty-four hours. Each horizontal row of

holes corresponds to the dial of a time switch, with each hole representing twelve minutes. The circuit can thus be energized in twelve-minute steps for any desired length of time up to 24 hours.

The daily timing schedules are selected by inserting pins in the proper holes on the smaller, weekly cylinder. The cylinder determines which row of holes on the large cylinder is to be used during any one day of a twelve-week period. The smaller cylinder moves around one notch every twenty-four hours and takes twelve weeks to make a complete revolution.

The equipment is driven by a Telechron synchronous motor and can be housed with the line relays in a standard 27-inch controller box for outdoor installation, or it can be mounted on an indoor central-station-type master control panel.

It is considerably less complicated and much more practical than the large number of time switches otherwise needed to perform the same function. In addition, a multiplicity of wiring needed to connect time switches is eliminated. Furthermore, different circuits can be set to operate simultaneously. Most of the parts are the same as those furnished for the automatic control of signals and bells in factories and schools.



Traffic control program device.

## Gar Wood Buys Buckeye Traction Ditcher Company

Gar Wood Industries, Inc., Detroit has completed the purchase of Buckeye Traction Ditcher Co., Findlay, Ohio, acquiring 92 per cent of its capital stock, it was announced recently by Glen A. Bassett, President of Gar Wood.

It is expected that Gar Wood Industries will expand the Buckeye operations, Mr. Bassett said, and that some products now manufactured by Gar Wood in Detroit, will be shifted to Findlay.

The acquisition of Buckeye, which is a leading manufacturer of ditchers, will round out Gar Wood's line of construction machinery. In this field Gar Wood is now one of the largest makers of dump bodies and hoists, and such earth-moving equipment as bulldozers and scrapers. Buckeye makes, in addition to ditchers, power shovels, fine graders, chip and aggregate spreaders, bulldozers and angle dozers and power control units.

## O'Neall Division, Armco Drainage, Moves to South Bend, Indiana

Armco Drainage & Metal Products, Inc. recently moved the headquarters for its O'Neall Division from Chicago to South Bend, Indiana. This company is a wholly owned subsidiary of The American Rolling Mill Company, Middletown, Ohio, and the O'Neall Division operates in the states of Indiana, Illinois and Lower Michigan.

Ken C. Thomas, Manager of the Division, has moved his family from Chicago to South Bend. Russell G. Betts, railway representative, and C. D. Beerup, sales engineer, will, however, remain in Chicago at 310 South Michigan Avenue.

An office has been established in the St. Joe Bank Building and negotiations are being completed for a site to build a fabricating plant in South Bend.

## Athey Adopts New Name

Athey Truss Wheel Co., Chicago, announces a change in name, effective at once, to Athey Products Corporation. B. F. Lease, President, also announces its products will bear the trade name, "APCOR."

Modernization of the name to conform with a new line of equipment is the reason for the change. In 1922, Athey Truss Wheel Co. began the manufacture of track-type wheels and trailer units for use in the earth-moving. The "truss type" design was made obsolete by the "Forged-Trak" style of wheel which is the current type of "Athey" wheel. Moreover, Mr. Lease points out, the "Athey" line has vastly expanded during the past decade and now includes highway maintenance and tractor-mounted Loaders, high-speed rubber-tired heavy-duty Trailers, in addition to Forged-Trak Wheels, Trailer and Wagon units.

The company address remains 5631 West 65th Street, Chicago 38, Ill.

## Hercules Powder Company Appoints New Sales Director for Explosives

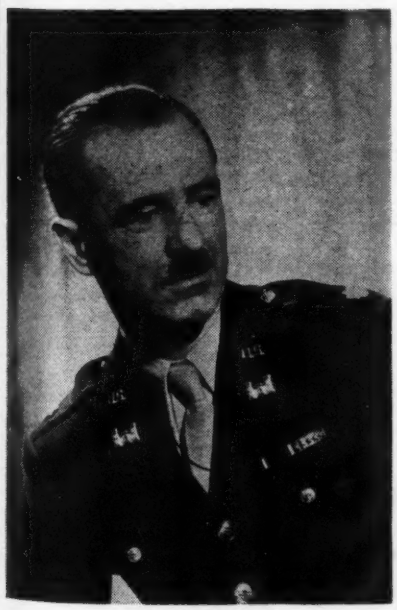
LeRoy Keane has been appointed director of sales of the Explosives Department, Hercules Powder Company, effective October 1, the company announced today. He succeeds C. C. Gerow, who has been director of sales since 1919.

## Col. Scripture Returns to Master Builders Co.

Lt. Col. E. W. Scripture, recently returned from Europe after serving three years with the Army Engineers, will resume his post on October 8th as Director of Research of The Master Builders Company, Cleveland, Ohio.

Col. Scripture entered the service in 1942 as a captain, and was assigned to the office of the Chief Engineer, European Theater of Operations. The first two years of his service overseas were in England where he took part in planning the invasion. In August 1944 Col. Scripture went to France where he continued planning for engineering operations on the continent. He was awarded the Purple Heart, Bronze Star Medal, Legion of Merit and presented with the Medaills, Louis de Broglie, by the Association des Engeineurs Docteurs de France.

Col. Scripture, also a veteran of World War I, having served in France for two years with the 26th Division, is widely known in the construction industry for his research work in the improvement of concrete and mortars. Outstanding among his developments is cement dispersion, used extensively to increase concrete durability.



Col. E. W. Scripture

## Dresser Industries Appoints Director of Distribution

Roy A. Bass has recently been appointed Director of Distribution of Dresser Industries, Inc., Cleveland, Ohio, a new post. Dresser Industries is the parent organization of 14 companies serving oil, gas and industrial markets and has 22 plants located throughout the country.

In this position he will be responsible for the national program of Dresser and

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## CONSULTING ENGINEERS

*(Continued from page 68)*



its member companies in the establishment and expansion of distribution in industrial centers.

An engineering graduate of Cornell, Bass has been active in both sales and marketing for a number of years. Before assuming his present duties, he was Buffalo District Sales Manager for Ross Heater & Mfg. Co., Inc., Buffalo, N. Y., with whom he has been connected for the past 11 years.

### Ralph B. Carter Co., Hackensack, New Jersey Appoints Additional Representatives

Announcement has been made by J. W. Van Atta, Vice President and General Manager of the appointment of the following representatives as direct factory agents: Brooks Equipment Company, Los Angeles, Calif., State of California; Henry G. Carter, Tampa, Fla., State of Florida; Harry E. Clark & Co., Houston, Texas, State of Texas; Ben F. Crabbe, Birmingham, Ala., and Georgia; Galigher Company, Salt Lake City, Utah, Tennessee and Northern Mississippi, Southern Idaho, Eastern Nevada and Utah; F. H. Godfrey Engineering Company, Seattle, Washington, Northern Idaho and Washington; The E. C. Holloway Company, Denver, Colo., Montana, Wyoming, Colorado and New Mexico; Holloway Engineering Company, New Orleans, La., Louisiana and Southern Mississippi; Jones-Rogers Co., Cleveland, Ohio, Eastern Ohio; Mecisa, Mexico, D. F., Mexico; Pasol Engineering Company, Omaha, Neb., Nebraska and Iowa; Riverside Iron Works, Calgary, Alberta, Province of Alberta; Sherman Machine & Iron Works, Oklahoma City, Okla., Oklahoma.

### Technical Help Now Available for Cities and Counties in New York and Northern New Jersey

Former municipal and county employees who are now serving the War Production Board are now available for interview by local governmental units or public works projects, it is announced by John A. Warner, Director of Region 2, consisting of New York State and northern New Jersey.

"The end of the war," Mr. Warner states, "has terminated many of the Board's activities, thus making possible the release of these specialists who have unselfishly remained with the Board until their tasks were completed."

It is emphasized that the personnel now available have had repeated contacts with many trades and businesses during their association with the Board, thus expanding their knowledge of industry as a whole. "Moreover," Mr. Warner adds, "these men and women have mastered the technique of co-operation between local and Federal governmental agencies. Such an asset will become increasingly valuable to any municipality, particularly during the reconversion period."

Any municipal or county government or project desiring to interview these specialists is invited to write to the Regional Director, War Production Board, Empire State Building, New York 1, N. Y., or telephone Murray Hill 3-6800, extension 700.

## NEW CATALOGS

**Below are described the latest catalogs received by PUBLIC WORKS. All are available free on request to the manufacturers whose names are given.**

### A New Booklet on Bar Screens

Rex Mechanically Cleaned Bar Screens are described in a new 8 page booklet now being distributed. An explanation of what the machine is and how it operates, as well as a presentation of its exclusive features is combined with typical job photographs and application drawings. A section of the brochure describes the Rex Triturator

as used in conjunction with the bar screen. Data tables and specifications are also included. Write Chain Belt Company, 1600 W. Bruce St., Milwaukee 4, Wisc., requesting bulletin No. 479.

### Standards on Concrete and Concrete Aggregates

In addition to all of the A.S.T.M. specifications and test methods covering concrete and concrete aggregates, this compilation issued for the first time in July, 1945, gives numerous other pertinent standards covering cement, concrete reinforcement, preformed expansion joint fillers, and sieves for testing purposes. In the section on aggregates there are two specifications covering lightweight aggregates for concrete, fifteen test methods (abrasion, sampling, soundness, specific gravity, absorption, structural strength, unit weight, etc.), and three sets of definitions. There is a specification for ready-mixed concrete and sixteen test methods on concrete (air content, compressive strength, flow sampling, slump test, volume change, etc.). Concrete curing materials are covered in four standards. The publication aggregating some 150 pages gives over 50 A.S.T.M. standards. Copies of this compilation can be obtained from A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia 2, Pa., at $1.50 each.

### Street Lighting Maintenance

Regular and thorough maintenance of a street lighting system equals in importance correct design of equipment and careful planning of installation, according to a new booklet "Hints on Lighting Maintenance" announced by the Lighting Division of the Westinghouse Electric Corp.

The new 24-page booklet outlines simple maintenance procedures that will result in maximum utilization of the street lighting system. Suggestions for planning a cleaning schedule are followed by methods of cleaning, and a listing of available cleaning powders and their manufacturers. Advantages of group lamp replacement plans are discussed, and cost studies suggested for choosing between individual and group replacement methods.

Curves illustrate the effect of high or low voltage and current on the life lumen output efficiency of lamps, and recommendations are made for regulation.

The new booklet lists specific points to be checked on luminaires, regulators, switches and relays at each regular inspection. Aerial ladders are recommended for easy access to luminaires. For small communities where this is not economically justified, lowering devices such as flexible cable over pulleys, are described and sketched. Maintenance check charts for quick reference are also included in the booklet.

Copies of booklet B-3455, "Hints on Street Lighting Maintenance" may be secured from Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

### Modern pH and Chlorine Control

*W. A. Taylor & Co.*
*7300 York Road*
*Baltimore 4, Md.*

During the past 15 years this firm claims to have worked out the solutions to problems of pH, Chlorine and Phosphate for practically every industry. Taylor Comparators and procedures have been incorporated into one extremely appropriate descriptive method —Taylor Liquitrol—the modern method for control of pH, Chlorine and phosphates.

Taylor Liquitrol Equipment, descriptions and prices, the meaning of pH and Chlorine Control, its application to 36 basic industries are fully discussed in a 92 page booklet.

If you are interested in pH Control write W. A. Taylor & Co. for a copy of this booklet.

## CONVENTIONS

December 12 . . . Maine Water Utilities Association. Bi-monthly meeting at Waterville, Maine.

December 13-15 . . . Four States Section, American Water Works Association. Annual meeting, Lord Baltimore Hotel, Baltimore.

January 14-18 . . . American Road Builders' Association will hold its forty-third annual convention at the Stevens Hotel in Chicago.